The Metals REVIEW

OWNED AND PUBLISHED BY THE MEMBERS OF THE AMERICAN SOCIETY FOR METALS

THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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Refresher Courses For Returned Veterans Offered Free by ASM

The 68 chapters of the American Society for Metals are offering refresher courses to returning veterans in an effort to be of the utmost possible assistance to them in assuming again their responsible positions in the metal industry. The purpose of the review course will be to bring the individual up to date on all new developments and processes that have taken place during his period of service.

There will be no effort on the part of the chapters to train returned veterans for the metal industry other than the usual educational courses offered during the fall and winter lecture season. The chapter will provide a refresher course only so that the returning veteran may become thoroughly familiar with the advances that have been made during his absence from his position in the metal industry.

The chapter will have no standing committee to give the refresher courses but each veteran reporting either to the national office or to the chairman of any chapter in the communities served by the Society will be given individual attention by the Returning Veterans Committee of the chapter. A conference committee of the necessary number will be selected from those members of the chapter who are best trained and most familiar with the field to be reviewed for the benefit of the veteran.

It is not planned to form classes or have a large group but to create an individual committee for each applicant for the course and to hold as many personal meetings with the veteran as may be necessary. This service will be free and available to all veterans returning to the metal industry, whether they are members of the Society or not.

Requests for this refresher course should be addressed to the National Secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, who in turn will see that the individual is referred to the chapter of the Society nearest his location.

LAST MONTH in the METAL INDUSTRY

Current Events

METALLURGICAL CURRICULA of 44 schools in the United States and Canada are outlined in detail on pages 2, 3 and 4, this issue. Degrees given, courses for the third and fourth years and facilities for post-graduate work are listed.

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TEMPLE UNIVERSITY inaugurates a new day school and holds a "Metallurgy Symposium" on the 25th anniversary of the evening classes. Program of the symposium given on page 2.

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METALS HANDBOOK EDITOR is chosen by the American Society for Metals. Dr. Lyman brings broad education and experience to new position. See page 3.

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AMERICAN FOUNDRYMEN'S ASSOCIATION will hold 50th Anniversary Convention and Exhibit in Cleveland in May 1946. See page 5.

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ASM MEMBERS AND DISCHARGED SERVICE MEN eligible for expanded employment service circulating qualifications among 600 metal industry executives. See page 4.

Products and Processes

PURNELL PROCESS for heat treating is based on uniformity of quench provided by propeller agitation, speed in quenching, accurate timing and immediate tempering. See Manufacturers' Catalogs, Item R251.

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VALVE FACING ALLOY of chromium, nickel, tungsten and cobalt gives long wear and retains hardness and corrosion resistance above 1000° F. See New Products, Item R238.

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COMBINATION FORGING FURNACE for both brass and aluminum has a temperature range of 800 to 1600° F. with precision heat control. See Item R236.

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METALLOGRAPHIC ILLUMINATING UNITS are doubled in efficiency by the use of a zinc sulphide film coating the clear glass illuminator plate. See Item R230.

Required Reading

STRAIN GAGE procedures for studying welding stresses require somewhat different techniques for obtaining consistent results. Methods described are accurate within ± 500 psi. Another article describes simple assemblages of electrical equipment used to measure and record indications given by electric strain gages. See Review of Current Metal Literature, this issue, Section 11 on Instruments, Items 11-54 and 11-62.

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PHOSPHATING is found to be an effective surface treatment to prevent or delay failure of gears by scuffing. See Section 7 on Cleaning and Finishing, Item 7-167.

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SPRING DESIGN varies widely in choice of working stresses. Fundamental principles used to calculate these stresses are applied to practical design, illustrated by actual applications in industrial and railway work. See Section 24 on Design, Item 24-65.

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FOUNDRY SAND SPECIFICATIONS based on new approach to classification of sand, clay, and silica flour facilitate and improve control of material. See Section 14 on Foundry Practice, Item 14-240.

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SECTIONAL RADIOGRAPHY solves difficulty in determining depth of defects in such materials as aircraft castings. See Section 12 on Inspection and Standardization, Item 12-161.

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SUB-ZERO HARDENING is shown to be distinctly beneficial on experimental heats of molybdenum high speed steel in which carbon content is kept deliberately high. See Section 18 on Heat Treatment, Items 18-182 and 18-188.

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CORROSION OF ALUMINUM in acids deterred by use of inhibitors, but no very effective chemical for use in sulphuric acid is known. Action of various inhibitors in various acids detailed in Section 6 on Corrosion, Item 6-109.

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IMPACT TEST FOR CAST IRON eliminates the "double-blow" effect and other variables and is simple and easy to standardize. See Section 9 on Testing, Item 9-100.

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ALUMINUM QUENCHED from box type air oven into a tank by means of a simple mechanism. See Section 18 on Heat Treatment, Item 18-199.

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WHERE TO FIND

Review of Current Metal Literature

PASS-A-ROUND

Many executives in your plant will want to see this record of what happened last month in the metal industry. Just fill in the names, note items for special attention — and Pass-A-Round.

Name	Item No.

Northwest Chapter Directors Plan Program

Members of the Board of Directors of the Northwest Chapter ASM hold organization meeting (top view, from left): C. A. Nagler, chairman, Program Committee; W. E. Sweet, chairman, Plant Visitation Committee; G. W. Johnson, vice-chairman; M. B. Borgeson, J. A. Harrington. (Lower view): O. W. Kromer, I. J. B. Demers, R. H. Lundquist, R. L. Dowdell, chairman, Round-Table Committee. Unable to attend were A. A. Gustafson, chapter chairman; Alexis Caswell, secretary-treasurer; W. E. Boker, V. R. Krause, LeRoy Owen, and L. D. Wolff. (Photograph by Herbert F. Scobie.)

Reported by Herbert F. Scobie
University of Minnesota

The 1945-46 board of directors of the Northwest Chapter held an organization meeting recently at the Covered Wagon in Minneapolis.

A tentative program was prepared under the direction of C. A. Nagler, University of Minnesota, and invitations have been sent to prospective speakers. Plant visitations, which have always been popular with local chapter members, may be possible in the coming season because security restrictions have been eased. A committee, to be selected by W. E. Sweet, Twin City Steel Treating Co., will consider this.

Vice-chairman G. W. Johnson, American Hoist and Derrick Co., outlined the plans of the Educational Committee and explained that the work would be correlated closely with the Plant Visitation Committee and the Round-Table Committee.

The Round-Table Committee was established to promote audience participation in technical discussions and freer exchange of ideas. R. L. Dowdell is chairman.

Earnshaw Cook Retires From Post of Chief Met. At American Brake Shoe

After 25 years of application and planning, Earnshaw Cook has announced his decision to retire from the active practice of metallurgy and is resigning as chief metallurgist of the American Brake Shoe Co. on Jan. 1, 1946. He will continue in a consulting capacity with the company and will engage in a limited amount of general consulting work on steel mill and foundry problems, and expects to do some metallurgical writing. He is already the author of "Open-Hearth Steel Making" published by the American Society for Metals in 1937, and was corecipient of the Howe Medal of the ASM in 1944 for the best paper to appear in the TRANSACTIONS of the Society.

Earnshaw Cook

Mr. Cook has been with American Brake Shoe Co. since 1933, being appointed chief metallurgist in 1939. Born in 1900, he was graduated from Massachusetts Institute of Technology and was employed at Bethlehem Steel Co. from 1922 to 1933. He has also served as consulting metallurgist since 1943 for the Kellex Corp., New York, which was responsible for an important phase of the "Manhattan Project" for developing the atomic bomb.

Raymond H. Schaefer will succeed Mr. Cook as chief metallurgist. He was graduated from Carnegie Tech in 1934, and was a metallurgist for the International Nickel Co. for five years before coming to the American Brake Shoe Co. in 1940 as assistant foundry metallurgist for American Manganese Steel Division in Chicago Heights. He was transferred to the main plant in Mahwah, N. J. in 1943 as assistant chief metallurgist.

Metallurgy Symposium Opens Day Course at Temple

The inauguration of a full daytime degree course in metallurgy at Temple University will be marked by a "Symposium in Metallurgy" to be held at the University on Sept. 28 in cooperation with the Philadelphia Chapter of the American Society for Metals. The symposium will also mark the 25th anniversary of the evening metallurgy program at Temple also sponsored by the Philadelphia Chapter. The program planned for the symposium follows:

9:30 a.m.—Chairman—Frank W. Blanchette, Moore Products Co.

New Developments in Quality Control

As Applied to Steel Manufacture and Working of Steel, by Adolph O. Schaefer, The Midvale Co.

As Applied to Welding and Welding Construction, by Arthur J. Raymo, Baldwin Locomotive Works.

As Applied to Finished Parts Fabrication; by G. W. Schorr, SKF Industries.

Statistical Quality Control Applied to Mass Production of Finished Parts, by Charles Scott, SKF Industries.

Summary, by Capt. H. L. Lackey.

2:30 p.m.—Chairman—Norman L. Mochel, Westinghouse Electric Corp.

The Sigma Phase of High Chromium-Nickel Alloys, by Francis B. Foley, The Midvale Co.

Panel Discussion.

Visitation to Temple University Metallurgical Laboratory.

6:00 p.m.—Dinner Speakers—Dr. Robert L. Johnson, President of Temple University and Dr. Charles H. Herty, Jr., National President ASM.

8:00 p.m.—Chairman—Lars E. Ekholm, Alan Wood Steel Co., Chairman, Philadelphia Chapter ASM.

The Electron Microscope and Its Application to the Study of Metals, by R. G. Picard, Radio Corp. of America.

AWS Cancels Annual Meeting, National Officers Will Meet in New York

The Annual Meeting of the American Welding Society usually held during October of each year will not to be held this year because of travel and housing difficulties.

A meeting of the national officers, the board of directors, and committee chairmen will be held in New York at the Hotel Pennsylvania on Oct. 18 to deal with matters which require official action that cannot be delayed. This group will also present the Society prizes, medals and other awards. The Program Committee of the Society has arranged for the presentation of the papers prepared for it in *The Welding Journal*, the Society's monthly magazine. A list of titles of these papers appears in *Welding Journal* for August, page 788.

METALLURGICAL CURRICULA

Offered by 44 Colleges and Universities in the United States and Canada

NOW THAT educational institutions will be receiving new students in metallurgical courses, the American Society for Metals has prepared for the assistance of its members and others interested a list of the educational institutions that have departments in metallurgy and offer degrees in that subject.

While the great majority of members may not have occasion to use this personally, it is suggested that they place this information in the hands of some individual who is planning to attend college and follow a metallurgical career.

Practically all the schools listed offer the same subjects in the freshman and the sophomore years. These subjects are required for all other engineering students. Therefore the subjects studied in first and second years have not been listed.

Reprints of this listing of institutions have been prepared, and if you would like to have a sufficient number of copies to place in the hands of high school seniors or members of the science clubs of the high school, the Society will be pleased to forward them to you at no cost.

If any school offering metallurgical courses has been omitted, please write the national office and information relative to this particular school will be published in a later edition of THE METALS REVIEW.

University of Alabama, College of Engineering, University, Ala. (Dean George J. Davis, Jr.)

Degrees Available: B.S. in Met.; B.S. in Met. Eng.; M.S. in Met.; M.S. in Met. Eng.

Courses Required: Catalog being revised.

University of Alaska, College, Alaska. (Howard G. Wilcox, Dean, School of Mines)

Degrees Available: B.S.; B. Min. Eng. (Met. Option)

Courses Required Third Year: Quant. anal.; intro. to met.; elec. eng.; mineralogy; heat.

Courses Required Fourth Year: English comp.; ore dressing; non-fer. met.; metallog.; phys. chem.; tech. writing; fer. met.; met. design; fuels and combustion; eng. thesis; electromet.

University of Arizona, College of Mines, Tucson, Ariz. (Dean T. G. Chapman)

Degrees Available: B.S. in Met. Eng.; M.S. in Met. Eng.

Courses Required Third Year: Chem. (vol. anal.); C.E. (anal. mech.); E.E. (d.c. lab.); phys. geol.; met. (assaying); phys. met.; min. eng. (elem. min.); colloid. chem.; C.E. (hydraul.); E.E. (a.c.); E.E. (a.c. lab.); M.E. (st. & gas pow.); non-fer. met.; met. (phys. lab.); electives.

Courses Required Fourth Year: Gen. org. chem.; phys. chem.; eng. econ.; met. (mineral dress.); fer. met.; calc. met.; pyro. met.; bus. adm. (acct.); C.E. (mech. matls.); met. (miner. dress.); met. (hydro.); met. (hydro. lab.); met. (less com. on metals); electives.

Post-Graduate Work: Complete facilities available in process met., especially mineral dressing and hydrometallurgy. Good facilities in physical metallurgy. Requirements for M.S. in Met. Eng. include B.S. in Met., two semesters of residence, and 30 units of graduate work.

University of California, Berkeley 4, Calif. (Ralph Hultgren, Assoc. Prof. of Phys. Met.)

Degrees Available: B.S.; M.S.; Met. Engr.; PhD.

Courses Required Third Year: Math.; str. of matl.; anal. mech.; mach. shop; proc. met.; metallog; elec. eng.; phys. chem.; humanities.

Courses Required Fourth Year: Prop. of metals; metal insp.; metal tech.; machine design; humanities; metallog.; proc. met.; thermodynamics.

Post-Graduate Work: Facilities offered for research in metallog., X-ray metallog., metal forming, and various fields of phys. met. and process met. Requirements: B.S. in engineering or scientific field.

Carnegie Institute of Technology, Pittsburgh 13, Pa. (Dr. R. F. Mehl, Head, Met. Dept.)

Degrees Available: B.S. in Met. Eng.; B.E. in Met. Eng. (5th year); M.S. in Met. Eng.; D.Sc. in Met. Eng.

Courses Required Third Year: Mechanics; phys. met.; proc. met.; phys. chem.; Ger.; social relations; phys. ed.; R.O.T.C.

Courses Required Fourth Year: Fer. metallog.; non-fer. metallog.; fer. met.; non-fer. met.; mech. met.; modern met. practice; seminar, thesis, tech. elective, humanistics elective, social relations; phys. ed., R.O.T.C.

Post-Graduate Work: Facilities are available for post-grad. work in alloys steels; adv. phys. met.; adv. mech. met.; crystallography; phys. chem. of met. reactions; adv. phase diagrams; theory & prop. of metals; met. problems; thesis; seminar.

Case School of Applied Science, 10900 Euclid Ave., Cleveland 6, Ohio. (Prof. Willard E. Nudd, Registrar)

Degrees Available: B.S. in Met. Eng., M.S. (with or without designation); Ph.D.

Courses Required Third Year: Econ.; mechs.; strength of matls.; a.c. & d.c. elec.; phys. chem.; ore dressing; iron & steel, assaying; plant insp.; metallog. technique.

Courses Required Fourth Year: Tech. or bus. option; phys. met.; fer. alloys; non-fer. production; X-rays; eng. economy; non-fer. alloys; thesis; electives.

Post-Graduate Work: Facilities and instruction are available for advanced degrees. Requirement is a degree from a recognized college or university.

Colorado School of Mines, Golden, Colo. (Clark B. Carpenter, Prof. of Met.)

Degrees Available: Met. Eng.; Master of Met. Eng.; D.Sc.

Courses Required Third Year: Fire assaying; non-fer. prod. met.; met. of iron & steel; prin. of ore dressing; met. chem.; phys. chem.

Courses Required Fourth Year: Spectroscopy, prin. of metallog.; ore dressing; met. of rare metals; phys. met.; adv. spectroscopy lab.; non-metallic minerals; hydromet.

Post-Graduate Work: Well equipped laboratory for research. Dept. will offer graduate courses in ore dressing; gen. met.; non-ferrous prod. met.; met. of rare metals; diffraction X-ray; spectroscopy; phys. met.; met. of iron & steel; and related subjects.

Columbia University, School of Mines, New York 27, N. Y. (Thomas T Read, Exec. Officer)

Degrees Available: B.S. in Met.; Met. Engr.; M.S. in Met.; Ph.D. in Met.

Courses Required Third Year: Phys. chem.; strength of matls. plus lab.; descr. geom.; eng. library technique; heat power; thermodynamics; process met.; wave motion & intro. to mod. phys.; phys. lab.; pyrometry; mod. foreign language; Ger.

Courses Required Fourth Year: D.c. apparatus & circ.; a.c. apparatus & circ.; met. of iron & steel; phys. met.; eng. met.; elem. ore dressing; intro. to mining; mineral econ., prin. of chem. eng.; mod. foreign language; Ger.

Post-Graduate Work: Facilities are available leading to the degrees listed above.

Georgia School of Technology, Atlanta, Ga. (Prof. O. M. Harrelson, Box No. 2096)

Degrees Available: No Met. degree.

Courses Required Third Year: All eng. students are required to take two semesters of metallurgal work, fer. and non-fer. metals.

Courses Required Fourth Year: Mech. eng. students required to take heat treating; metallog.; fer. and non-fer. metals.

University of Idaho, School of Mines, Moscow, Idaho. (A. W. Fahrenwald, Dean)

Degrees Available: B.S. in Met. Eng.; M.S. in Met. Eng.; Met. Engr. (Prof. Deg.)

Courses Required Third Year: Prin. of met.; fire assaying; iron & steel.

Courses Required Fourth Year: Met. calculations; ore dressing; Non-fer. met.; met. plant design; phys. met.; senior seminar.

Post-Graduate Work: Lab. equip. and offices available for graduate students. Normally two research fellowships are granted by the Idaho Bureau of Mines and Geology, and under these fellowships the M.S. degree may be secured in one year. In the past, most of the graduate work has been in the field of ore dressing, but equipment is available for work in other branches of extractive metallurgy and in physical metallurgy.

University of Illinois, Dept. of Mining and Met. Eng., 311 Ceramics Bldg., Urbana, Ill. (Prof. H. L. Walker, Head of Dept.)

Degrees Available: B.S.; M.S.

Courses Required Third Year: Elem. phys. chem.; phys. met.; fer. met.; met. calc.; prin. of mineral dressing; elective or met.; ind. furn. design; fer. metallog.; fer. metallog. lab.; non-fer. met.; resistance of matls.; resistance of matls. lab.; ind. fuels & furn.

Courses Required Fourth Year: D.c. and a.c. circuits & machines (E.E.); d.c. and a.c. circuits & machines lab. (E.E.); non-fer. metallog.; non-fer. metallog. lab.; electromet.; adv. lab. testing matls.; met. seminar; physics of metals (thesis or met.); app. of elec. equip.; elec. equip. lab.; pyrometry (ceramics); met. of deep drawing & pressing; alloy steels & special fer. alloys; elective or met. thesis; phys. met. lab.

Post-Graduate Work: Facilities of scientific apparatus, space, library, etc., as are normally found in graduate schools. Requirements for M.S. are 8 units of graduate work (equivalent to 32 semester hours). The student is required to pursue a research project and present a thesis. A comprehensive oral examination is given during the last month of residence. A minimum of two semesters of residence at the University is required.

University of Kansas, Lawrence, Kan. (Dr. Eugene A. Stephenson)

Degrees Available: B.S. in Met.

Courses Required Third Year: Gen. met.; met. of iron & steel; ore dressing; mineralogy; d.c.; non-tech. elective; met. lab.; non-fer. met.; dynamics; str. of matls.; str. of matls. lab.; a.c.; Engl. adv. comp.

Courses Required Fourth Year: Metallog.; ore dressing; phys. chem.; intro. econ.; tech. & non-tech. elective; val. of mineral properties; struc. design; phys. chem.; X-rays; indus. admin.; electives.

Post-Graduate Work: Graduate courses have not been developed, but where students have been anxious to continue study after graduation they are urged to take additional courses in chem. and phys. since a broad foundation in these fundamental sciences is believed most conducive to high attainment in research.

Lafayette College, Easton, Pa. (Prof. Luther F. Witmer)

Degrees Available: B.S. in Met. Eng.; M.S. in Met. or Met. Eng.

Courses Required Third Year: Anal. mech.; phys. met.; fuels; phys. chem.; mineralogy; heat eng.; mech. of matl.; assaying; elements of elec. eng.; elec. eng. lab.; mine safety; met. calc.

Courses Required Fourth Year: Met. eng.; met. lab.; pro-seminar; mineral dressing; int. econ. relations; elective; non-fer. met.; iron & steel; eng. repts.; pub. speaking.

Post-Graduate Work: Facilities for post-graduate work leading to the M.S. degree.

Lehigh University, Bethlehem, Pa. (E. K. Smiley, Dir. of Admissions)

Degrees Available: B.S. in Met. Eng.; Met. Engr.; M.S.; Ph.D.

Courses Required Third Year: Mech. of matls.; phys. met.; Engl.; electrochem.; geol.; met. of iron & steel, metallog.

Courses Required Fourth Year: Phys. chem.; elec. eng.; non-fer. met.; tech. speaking; heat engines; adv. iron & steel; electives.

Post-Graduate Work: Res. in iron and steel; phys. met., especially elec. welding; radiography; fatigue; furnace atmosphere; heat treatment; non-fer. res. in electroplating and brasses.

Massachusetts Institute of Technology, Cambridge 39, Mass. (Admissions office.)

Degrees Available: B.S.; M.S.; Sc.D., Ph.D.

Courses Required Third Year: Met. iron & steel; phys. met.; mineral dressing; phys. chem.; mineralogy; elem. crystallog.; econ. prin. (humanities); heat measurements; non-

fer. met.; met. lab.; met. calc.; ind. non-fer. alloys; mineral dressing; quant. mineragraphy; mining.

Courses Required Fourth Year: Metal proc.; testing matls. lab.; met. thermodynamics; ind. phys. met.; elec. eng.; humanities; electives; thesis.

Post-Graduate Work: Splendid facilities for research work. Dept. of met. offers graduate work leading to M.S. or D.Sc. in Met. Major divisions are process met., phys. met., and mineral dressing.

McGill University, Montreal, Que., Canada. (J. U. MacEwan, Birks Prof. of Met., Dept. of Mining and Met. Eng.)

Degrees Available: Bach. of Eng. in Met.; Master of Eng. in Met.

Courses Required Third Year: Met. of iron & steel; elem. met. lab.; met. problems; fire assaying; elem. mineral dressing.

Courses Required Fourth Year: Gen. met.; adv. met.; electromet.; phys. met.; met. problems & design; met. thesis; mineral dressing & lab.

Post-Graduate Work: Courses offered in phys. met.; hydromet.; mineral dressing.

Michigan College of Mining and Technology, Houghton, Mich. (L. F. Duggan, Registrar)

Degrees Available: B.S. in Met.

Courses Required Third Year: Phys. ed.; phys. chem.; met. of iron & steel; pyrometry, metallog.; met. calc.; mineral dressing; elec. power; hydro. met.; pattern shop.

Courses Required Fourth Year (Physical Metallurgy): Phys. ed.; electromet.; app. electromet.; adv. phys. met.; alloy steels; prin. of furn. design & constr.; appl. heat treat.; protective coatings; X-rays; adv. rept. writing; econ., Am. gov. & pol.; mech. of matls.

Courses Required Fourth Year (Process Metallurgy): Phys. ed.; quant. anal.; gas & fuel anal.; electromet.; app. electromet; foundry; prin. of furn. design & constr.; pyromet. lab. prac.; adv. rept. writing; econ.; Am. gov. & pol.; mech. of matls.

Post-Graduate Work: Facilities for post-graduate work leading to M.Sc. degree.

University of Minnesota, School of Mines & Metallurgy, Minneapolis, Minn. (T. L. Joseph, Prof. of Met. and Head of School)

Degrees Available: B.S. in Met. Eng.; Met. Engr. (five years); M.S.; Ph.D.

Courses Required Third Year: Statics; str. of matls.; dynamics & mine plant; base metals & prec. metals; ore dressing & electromet.; rock study; ore dressing; microscopy; petrog.; mining; additional ore dressing; foundry prac.; forging; welding; heat treat. & mach. shop prac.; metallog.

Courses Required Fourth Year: Ore testing & adv. met.; metallog.; additional ore testing; problems in non-fer. met. & met. hydraulics; app. electrochem. & chem. of eng. matls.; problems in fer. met. & adv. metallog.; matls. testing lab.

Post-Graduate Work: Good facilities available for post-graduate work leading to M.S. and Ph.D. degrees.

University of Missouri, School of Mines and Metallurgy, Rolla, Mo. (The Registrar)

Degrees Available: B.S. in Met. Eng.; B.S. in Gen. Sci. Met. Option; M.S. in Met.; M.S. in Met. Eng.; Ph.D. in Met.

Courses Required Third Year: Quant. anal.; app. or gen. eng. draw.; phys. chem.; Engl.; engr. mechanics-statics; intro. met.; prin. of met.; elec. circ. & mach.; phys. chem.; mech. of matls.; met. of iron & steel; ore dressing; phys. met. test. lab.; elec. mach.; elec. circ. & machines; electives.

Courses Required Fourth Year: Prin. of econ.; power plants lab.; thermodynamics; met. calc.; met. of non-fer. metals; ore dressing; alloys & met.; current econ. problems; power plants; alloys & metallog.; senior trip, electives.

Post-Graduate Work: Excellent facilities for post-graduate work leading to M.Sc. and Ph.D. degrees. Close proximity to various labs. U. S. Bureau of Mines on campus.

Montana School of Mines, Butte, Mont. (W. M. Brown, Registrar)

Degrees Available: B.S. in Met. Eng., Mining Eng. and Geol. Eng. M.S. in same field and in Mineral Dressing.

Courses Required Third Year: Phys. & electro-chem.; Engl.; mech.; hydraulics; met.; mining.

Courses Required Fourth Year: Met.; power transmission; thermodynamics; econ.; mineral dressing.

Post-Graduate Work: Lab. equipment in phys. met., process met., spectroscopy, micro-met., and mineral dressing.

University of Nevada, Mackay School of Mines, Reno, Nev. (Walter S. Palmer, Prof. of Met.)

Degrees Available: B.S. in Met. Eng.

Courses Required Third Year: Mech., fire assaying; fer. met.; phys. chem.; metallog.; ore dressing; geol.

Courses Required Fourth Year: Pyro & hydro met.; elec. eng.; electromet.; testing of matls.; str. of matls.; problems & proj.; electives.

Post-Graduate Work: No facilities available.

New Mexico School of Mines, Socorro, New Mex. (Ruby Griffith, Registrar)

Degrees Available: B.S. in Met. Eng.

Courses Required Third Year: Prin. of met.; met. of iron & steel; fire assaying; metallog.

Courses Required Fourth Year: Met. of non-fer. metals; met. calc.; electromet.; ore dressing.

Post-Graduate Work: Not offered at present.

North Carolina State College of Agriculture and Engineering, Raleigh, N. C. (Dr. Wm. G. Van Note)

Degrees Available: Bach. of Mech. Eng. (Metals Option)

Courses Required Third Year: Eng. mech.; mach. shop; eng. thermodynamics; mech. eng. lab.; kinematics; matls. of constr.; met.; str. of matls.; fluid mech.; bus. law; econ.; tech. writing; electives.

Courses Required Fourth Year: Gen. econ.; elements of elec. eng.; elec. eng. lab.; mach. design; power plants; mech. eng. lab.; theory of welding; weld. prac.; phys. met.; electives.

Post-Graduate Work: Adequate facilities available for M.S. candidates. Metals option in mech. eng. is the outgrowth of an earlier option in welding and some of the hours now devoted to welding are to be changed to additional work in metallurgy.

University of North Dakota, Grand Forks, N. D. (Dean L. C. Harrington, College of Engineering)

Degrees Available: B.S. in Chem. Eng.; B.S. in Mining Eng.

Courses Required Third Year: Mine surveying; Str. of matls.; anal. mech.; elec. machinery; comp. & lit.; mineralogy; mach. shop; mech. lab.; fer. met.; ore treatment & milling; assaying; non-fer. met.

Courses Required Fourth Year: Mine surveying; struc. design; elec. lab.; ore deposits; petrog; struc. geol.; mining eng.; ore treatment & milling; metallog.; fundamentals of speech; electives (18 available).

Post-Graduate Work: None in metallurgy.

University of Notre Dame, Notre Dame, Ind. (Prof. E. G. Mahin, Head of Dept. of Met.)

Degrees Available: B.S. in Met.; M.S.; Ph.D.

Courses Required Third Year: Ger.; quant. anal.; intro. to mod. phys.; statics; dynamics; str. of matls.; mach. shop; phys. test. of metals; phys. chem. of prod. met.; non-fer. proc. met.

Courses Required Fourth Year: Philos.; Eng.; Fr.; Econ.; elements of elec. eng.; non-fer. metallog.; alloy steels; adv. phys. met.; ind. proc. of metals; seminar, elective.

Post-Graduate Work: Matls. of met.; X-ray metallography; phys. of metals; adv. alloy steels; research. Laboratory facilities for advanced research in many fundamental and applied lines. A metallurgical library available at all times for reading and research.

Ohio State University, 100 Lord Hall, Columbus, Ohio. (Prof. D. J. Demorest, Head, Dept. of Met.)

Degrees Available: B. in Met. Eng.; M.S.

Courses Required Third Year: Mechanics; str. of matls.; met.; ore dressing & coal cleaning; prin. of metallog.; fuels; ind. engr.; forging & heat treat.; dynamics; adv. ore dressing; pyrometry; iron & steel; metallog. of iron & steel; elec. eng.; physics; adv. phys. lab.; mechanics of fluids; non-fer. met.; elec. eng.; mod. atomic spectroscopy; mineralogy; microscopic mineralogy; insp. trip.

Courses Required Fourth Year: Mineralogy; thermochem. mineralogy; mine eng.; mine surveying; mech. eng.; mach. design; met.; adv. fuel testing & problems; metallog. of alloy steels; met. constr.; steel making; met. invest.; prod. of light metals; adv. thermochem. mineralogy; met. thesis; phys. met. of light metals & alloys; elective.

Post-Graduate Work: Facilities leading to degrees listed above.

Oregon State College, Corvallis, Ore. (Dr. A. W. Schlechten)

Degrees Available: B.S. and M.S. in Met. Eng.; Prof. Met. Engr.

Courses Required Third Year: Three metallurgical courses.

Courses Required Fourth Year: Three metallurgical courses.

Post-Graduate Work: Facilities and courses only for M.S. degree.

Pennsylvania State College, State College, Pa. (Dr. M. Gensamer)

Degrees Available: B.S., M.S., Ph.D. in Met. It has not yet been decided to grant these degrees in Met. Eng. as well.

Courses Required Third and Fourth Year: Courses are not listed because they are being revised.

Post-Graduate Work: Facilities very complete. Requirement for post-graduate work, B.S. degree from a reputable institution and high scholastic standing.

University of Pittsburgh, Department of Metallurgical Engineering, 109 State Hall, Pittsburgh, Pa. (G. R. Fitterer, Dept. Head)

Degrees Available: B.S.; M.S.; Ph.D.; Met. Engr.

Courses Required Third Year: Phys. chem.; app. elec.; mech. of matls.; Non-fer. prod. met.; elem. metallog.; elective; mines seminar; power plants; iron blast furn.—manuf. of pig iron; met. calc.; metallog. and heat treat.

Courses Required Fouth Year: Tech. Engl.; met. plant layout; liquid steel control meth.; adv. met. calc.; phys. met.; electromet.; Eng. thesis; elective; mines seminar; elem. econ.; first aid and safety.

Post-Graduate Work: All types of facilities available for graduate work; also a program of graduate work in industry. Some research fellowships are available through cooperative research with industrial plants in the Pittsburgh district.

Purdue University, School of Chemical and Metallurgical Engineering, Lafayette, Ind. (J. L. Bray, Head)

Degrees Available: B.S., M.S., Ph.D.

Courses Required Third Year: App. mech.; mineral dressing; phys. chem.; chem. or elective; non-fer. met.; phys. prep.; econ.; fer. met.; thermodynamics; phys. met.

Courses Required Fourth Year: Elec. eng.; app. thermo.; met.; plastic met.; X-ray; met. eng.; elective; phys. prep.; ind. mgt.; fluid flow & heat transfer; non-fer. metallog.

Post-Graduate Work: Facilities for graduate work leading to the degree of M.S. in Met. Eng.

Queen's University, Kingston, Ont., Canada. (Miss Jean I. Royce, Registrar)

Degrees Available: B.S.; M.S.

Courses Required Third Year: Quant. anal.; phys. chem.; organic chem.; thermo; mineralogy; gen. eng.; elective; mech. met.; ore dressing; fire assaying.

Courses Required Fourth Year: Phys. chem. (electro chem.); mining; met.; met. lab.; metallog.; hydraulics; milling; econ.; mineralogy; summer essay.

Post-Graduate Work: B.S. required. Full facilities available for post-graduate work leading to Master's Degree in mineral dressing, chem. or phys. met.

Renesselaer Polytechnic Institute, Troy, New York. (Dr. M. A. Hunter, Head, Dept. of Met. Eng.)

Degrees Available: B. Met. Eng.; M. Met. Eng.; Ph.D.

Courses Required Third Year: Econ. prin.; mech. eng.; phys. chem.; str. of matls.; prod. met.; weld. proc.; metallog.; phys. met.; elec. eng.

Courses Required Fourth Year: Chem. eng.; geol.; phys. met.; weld. theory & lab.; non-tech. elective; tech. elective; app. comp.; electromet.; thesis.

Available Fifth Year: Study-work curriculum for cooperative training with industry. Combined courses, five or six years in duration, are offered in which met. eng. may be combined with another curriculum in eng. or science. Naval Reserve Officers' Training Corps. Cooperative arrangements with other colleges; acceptance of credits for subjects in liberal arts.

Post-Graduate Work: Metallog.; radiography; X-ray diffraction; spectrographic anal.; electromag. anal.; photomicrog.; mech. testing; phys. met.; electromet.; stress corrosion; sand testing; melting; mech. working; heat treat.; machine shop.

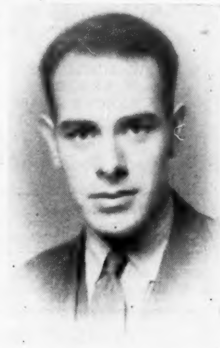
Rutgers University, College of Engineering, New Brunswick, N. J. (R. L. Anthony, Chairman, Dept. of Mech. Eng. or J. D. Stetkewicz, in charge of Met.)

Degrees Available: B.S. in Mech. Eng.; M.S.; Ph.D.; Met. Engr. available to graduates of Rutgers.

(*Continued on page 4*)

ASM Appoints Lyman As Handbook Editor

The American Society for Metals has announced the appointment of Taylor Lyman as editor of the ASM Metals Handbook and secretary of the Metals Handbook Committee, effective Sept. 1. He will also serve as editor of the Buyers' Guide and Data Book, published annually by the Society.



Taylor Lyman

As editor of the Handbook, Dr. Lyman will continue the monumental work achieved by his predecessor, J. Edward Donnellan, in building it from a thin looseleaf notebook into a bound volume of 2,000 pages. A much-needed and revised edition of the Handbook is planned to appear in 1946.

Dr. Lyman received his Ph.D. in metallurgy from University of Notre Dame in 1944 and has since been metallurgist for Bendix Products Division of Bendix Aviation Corp. He attended Yankton College (South Dakota) in 1935-36, received his A.B. from Stanford University in 1940, and has since done graduate work at Harvard, M.I.T., Columbia University, University of Chicago, and Notre Dame. His experience includes a term as inspector of engineering materials at Fort Peck Dam, Mont., summer employment as technical lecturer for Ford Motor Co., a literature research and writing project for Hardy Metallurgical Co., and teaching positions at Columbia University, Illinois Institute of Technology, and University of Notre Dame.

Dr. Lyman was vice-chairman last year of the Notre Dame Chapter of the ASM, and is a member of a number of other technical societies.

New York University Offers Courses In Powder Metallurgy and Research

The Graduate Division, College of Engineering, New York University, is offering a number of evening courses during the fall term. Two of the courses of interest to metallurgists are on "Powder Metallurgy" and "Principles and Practice of Industrial Research."

The research course, which meets on Thursday evenings, 7:30 to 9:30, is presented by a distinguished group of directors of research from industry and will include a discussion of all phases of the operation of industrial research laboratories.

"Powder Metallurgy" is a comprehensive lecture and laboratory course, with lecture sessions on Tuesday evenings and laboratory on Fridays. It is offered by Adjunct Professor C. G. Goetzel of the Department of Chemical Engineering.

Instrument Educational Conference Sponsored by Carnegie Tech in October

An educational conference on instrumentation sponsored by the Carnegie Institute of Technology and The Instrument Society of America has been arranged for October 16, 17, and 18, 1945.

The program will be divided into two parts. The first part covers the requirements expected by industries and the second part will be devoted to present training in instrumentation.

The chairman of the Committee is B. R. Teare, Jr., head of the Department of Electrical Engineering of the Carnegie Institute of Technology, Pittsburgh 13, Pa. Traveling requirements have limited the conference to 150 and invitations will be sent to those in the order in which applications for attendance are received. Such applications should be made to Dr. Teare.

A.S.M. Annual Meeting Notice

To the Members of the A.S.M.:

This is your official notice that the annual meeting of the American Society for Metals will be held in the Cleveland Club, Cleveland, on Friday afternoon at 4:00 p.m., Nov. 2, 1945. All members of the Society in good standing are privileged to attend and vote.

W. H. Eisenman, Secretary

Cleveland, Ohio, September 15, 1945

The Metals REVIEW
THE MONTHLY SURVEY AND DIGEST OF WHAT'S NEW IN METALS

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KENT R. VAN HORN, *President*
C. H. HERTY, JR., *Vice-President*
WILLIAM H. EISENMAN, *Secretary*
HARRY D. McKINNEY, *Treasurer*

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Ray T. Bayless....................*Editor*
M. R. Hyslop....................*Managing Editor*

Cleveland, Ohio—September, 1945
Volume XVIII No. 9

Compliments

To F. J. WALLS of International Nickel Co., Detroit, on his election as president of the American Foundrymen's Association; to S. V. WOOD, Minneapolis Electric Steel Castings Co., on his election as vice-president; and to the following newly elected directors: GEORGE K. DREHER, Ampco Metals, Inc. (a past chairman of the Milwaukee Chapter ASM); E. W. HORLEBEIN, Gibson & Kirk Co.; H. H. JUDSON, Goulds Pumps, Inc.; JAMES H. SMITH, Accessories Group, General Motors Corp.; and F. M. WITTLINGER, Texas Electric Steel Casting Co.

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To SIGURD B. SWANSON, president and treasurer of the Apex Tool Co., Bridgeport Conn. on his election to the board of directors of the West Side Bank of Bridgeport.

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To JOHN R. TOWNSEND of Bell Telephone Laboratories, Inc., on his election as president of the American Society for Testing Materials; to T. A. BOYD of General Motors Research Laboratories on his election as vice-president; and to JOHN R. FREEMAN, JR., L. J. MARKWARDT, CARLTON H. ROSE, L. P. SPALDING, and WILLIAM A. ZINZOW, on their election to the Executive Committee.

Employment Service Expanded To Aid Members in Relocation

Increased emphasis will be placed by the American Society for Metals on assisting members who have been engaged in special war production manufacturing plants and who have been dislocated by the cancellation of contracts.

The Society has always served as a medium for bringing its members in contact with prospective employers by publishing advertisements of positions open and men available in THE METALS REVIEW. However, a more intensive plan for bringing qualifications of members to the attention of an extensive list of metal industry executives has now been formulated.

Any member of the Society may send for an employment form and fill it out, giving his education, experience, type of employment desired, and other pertinent data. A brief of these qualifications will be published in THE METALS REVIEW.

Furthermore, the Society has prepared a list of employing personnel from some 600 firms in the metal industry and will send them regularly bulletins listing and describing the qualifications of the men available. It will then be possible for the prospective employer to write to the national office and receive photostatic copies of the information submitted by the member in whom he is interested and about whom he wishes additional information. If after the photostat is received the prospective employer is further interested in the member, he may communicate with him direct.

Members desiring to avail themselves of this service should write to the national office of the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, for an employment form so that they may submit the necessary information. There is no charge for this service to either the member or the employer.

METALLURGICAL CURRICULA

(*Continued from page 3*)

Courses Required Third Year: Heat power; elec. eng.; mech. of matls.; eng. anal.; hydraulics; electives.

Courses Required Fourth Year: Eng. econ.; aerodynamics; mech. design; heat power; electives.

Post-Graduate Work: Laboratory is equipped for standard metallurgical work.

South Dakota School of Mines and Technology, 500 East Saint Joseph St., Rapid City, S. D. (H. Merle Parsons, Sec. and Registrar)

Degrees Available: B.S. in Met. Eng.; M.S. in Met. Eng.

Courses Required Third Year: Phys. chem.; surveying; mechanics (statics); deter. mineralogy; metals & alloys; pub. speaking; proc. met.; mineral dressing; gen. shop prac.; metal applications; adv. min. dressing.

Courses Required Fourth Year: Theo. electrochem.; d.c. machines; ore testing; heat treat. & pyrom.; prin. of econ.; elements of sociology; electives; research & thesis; elem. a.c. circuits; met. calc.; phys. met.; prin. of econ.; tech. writing; a.c. machines; res. & thesis.

Post-Graduate Work: The usual facilities and requirements of a metallurgical course.

Stanford University, Stanford University, Calif. (O. Cutler Shepard)

Degrees Available: Bachelors; Masters; Engineers; Doctors.

Courses Required Third Year: Statics; dynamics; str. of matls.; descriptive geom.; thermodynamics; pub. speaking; chem. (qual. and quant.); heat power lab.; atomic physics; differential equations; shop (foundry); process met.

Courses Required Fourth Year: Chem. (phys.); elec. eng.; fluid mech.; gen. econ.; eng. econ.; adv. mech. of matls.; insp. & test. of metals; optical technique; assaying; metallog; met. calc.

Post-Graduate Work: The four-year program leading to A.B. degree is not specialized and is intended to prepare for graduate work in either process metallurgy or physical metallurgy. Graduates are expected to aim for the engineering degree requiring two years. Should they lack funds to continue or aptitude, they can take the master's degree at the end of one year; three years, the Ph.D. degree.

Temple University, Philadelphia 22, Pa. (Charles E. Metzger, Director)

Degree Available: B.A. in Met.

Courses Required Third Year: Phys. chem.; met.; mechanics; X-rays; electives.

Courses Required Fourth Year: Met.; physics (crystal structure); electives.

Agricultural and Mechanical College of Texas, College Station, Texas. (Frederick A. Burt, Acting Head of Dept. of Geology)

Degrees Available: None listed.

Courses Required: A two-credit theory course in met. of iron and steel offered by the dept. of chem. eng. A three-credit theory and lab. course in phys. metallog. of iron and steel. The lab. work involves polishing and etching specimens and studying photomicrographs.

University of Texas, College of Mines & Metallurgy, El Paso, Texas. (Eugene M. Thomas, Dean of Eng.)

Degrees Available: B.S. in Mining Eng. (Met. Option; Mining Option)

Courses Required Third Year: Quant. anal.; phys. chem.; calculus; ore dressing & milling; mining meth.; app. mech. & graphic statics; gen. econ. geol.; gen. met.; assaying; sound & light.

Courses Required Fourth Year: Prin. of econ. str. of matls.; met. of iron, copper and lead; met. of leaching proc.; adv. ore dressing; ore dressing lab.; management; st. power plants; elec. cir. & mach.; masonry & reinforced concrete; met. lab.; metallog.

Post-Graduate Work: Facilities are available.

University of Toronto, Toronto, Ont., Canada. (The Dean, Faculty of Applied Science)

Degrees Available: Bach. of App. Sci.

Courses Required Third Year: Anal. chem.; assaying; bus.; elec. machy.; electrochem.; elem. struct. eng.; eng. problems & drawing; heat eng.; heat engines (theory); metallog. lab.; met.; mod. world hist.; ore dressing; phys. met.; pol. sci.; prin. of ore dressing.

Courses Required Fourth Year: Assaying, electrochem.; eng. econ.; mach. design; metallog. lab.; met. theory; met.; met. problems; mod. pol. & econ. trends; ore dressing; philos. of sci.; phys. met.; plant mgt.; profession of eng.; thesis.

Post-Graduate Work: Degrees given in met. eng., M.A., Sc. and Ph.D.

University of Utah, Salt Lake City, Utah. (Dr. John R. Lewis, Head Dept. of Met. Eng.)

Degrees Available: B.S. in Eng.; M.S. (Major in Met.)

Courses Required Third Year: Elec. machy.; eng. mech.; heat power eng.; phys. chem.; elem. mining & gen. met.

Courses Required Fourth Year: Ore dressing; fire assaying; phys. met.; adv. non-fer. met.; adv. fer. met.; met. calc.

Post-Graduate Work: A limited number of post-graduate fellowships available. Ordinarily a student on a fellowship can complete the requirements for the M.S. degree in one school year.

Virginia Polytechnic Institute, Dept. of Met., Blacksburg, Va. (H. V. White, Head, Dept. of Met., or E. B. Norris, Dean, Sch. of Eng.)

Degrees Available: B.S., M.S. (Met. Eng.)

Courses Required Third Year: Dynamics, mech. of matls.; phys. chem.; tech. Engl.; mineralogy & rock study; forging; mach. shop; metallog.; met.; military or non-tech. electives; ore dressing; pyrometry.

Courses Required Fourth Year: Matls. of eng.; elements of elec. eng.; geol.; fer. met.; non-fer. met.; metallog. of iron & steel; phys. met.; electromet.; fire assaying; met. journal review; military or non-tech. electives; spectroscopy; approved electives.

Post-Graduate: Facilities available for post-graduate work leading to M.S. degree.

Washington University, St. Louis, Mo. (Herbert Kuenzel, Asst. Prof. Mech. Eng.)

Degrees Available: None in Met.

Couses Required: Two five-hour courses in eng. dept. on phys. met. and eng. met.

West Virginia University, Morgantown, West Va. (J. R. Macdonald, Asst. Prof., Dept. Chem. Eng.)

Degrees Available: B.S. in Chem. Eng. (Met. Option). M.S. in Chem. Eng. (Met. Option).

Courses Required Third Year: Organic chem.; phys. chem.; elements of chem. eng.; eng. chem. lab.; coal lab. (E.M.); mech. of matls.; chem. eng. econ.; eng. society; unit organic processes (Ch. E.); chem. eng. design; heat & power eng. (M.E.); kinetics; fluid mech. (C.E.)

Courses Required Fourth Year: Chem. eng.; fer. met.; fer. met. lab.; non-fer. met.; metallog.

Post-Graduate Work: Laboratory facilities very complete.

Yale University, School of Engineering, New Haven, Conn. (C. H. Mathewson, Chairman, Dept. of Met.)

Degrees Available: B. Eng.; M. S.; M. Eng.; Ph.D., Eng. D.

Courses Required Third Year: Assaying & sampling; chem., incl. lab. (elem. phys. chem.); econ.; mechs. (statics & dynamics); prin. of met.; elective.

Courses Required Fourth Year: Elements of elec. eng.; mechs. & str. of matls.; metal tech.; metallog.; met. lab.; gen. met.; met of iron & steel; two electives.

Post-Graduate Work: The usual facilities for lab. work in preparing and testing metal products. Requirements for post-graduate work are flexible depending upon the degree sought and the kind of specialization desired.

Plaque Honors Long Chapter Service

Reported by John R. Dobie
Heat Treat Foreman, American Steel & Wire Co.

Chester M. Inman (second from left) was presented a plaque and named chairman emeritus in recognition of his outstanding service to Worcester Chapter ASM, particularly in obtaining its large sustaining membership of more than 80 members. Chapter Chairman Rudolph A. Johnson is shown making the presentation. At the extreme left is Walter B. Dennen, director of the Worcester Boys Trade School, and at the right is William B. Sharav, metallurgical engineer of the development laboratory, Linde Air Products Co., who spoke on "Flame Hardening."

Foundrymen Plan 50th Anniversary Convention and Exhibit in 1946

The American Foundrymen's Association has announced plans to stage its 50th Anniversary Foundry Congress and Foundry Show in the Cleveland Auditorium, Cleveland, next May.

The meeting will be staged as an International Foundry Congress, with attendance from foundrymen of England, France, Belgium, Russia, Mexico, South America, South Africa, Australia, China and other countries. This will be the third International Foundry Congress to which the American Foundrymen's Association has played host; the first was in Detroit in 1926, and the second in Philadelphia in 1934. A 1946 International Congress will make available to the entire foundry industry many outstanding and hitherto secret developments which have played a tremendous part in helping to win the war.

Named Factory Manager for Kelite

Hunter Nicholson has been appointed Los Angeles factory manager of Kelite Products, Inc. Mr. Nicholson, a chemical engineer, graduated from the California Institute of Technology, has had production experience with such companies as American Potash and Chemical Co., the Dicalite Co., A. R. Mass Chemical Co. and the Firestone Tire and Rubber Co.

Atlanta Utilities President Named AGA Managing Director

H. Carl Wolf, president of the Atlanta Gas Light Co., Atlanta, Ga., has been elected managing director of the American Gas Association, effective Oct. 1. Mr. Wolf will succeed Alexander Forward, managing director since 1923, who is retiring from active business.

H. C. Wolf

Mr. Wolf was graduated from the University of Illinois, earning both his Bachelor's and Master's degrees in electrical engineering. He entered the utilities field as assistant engineer for the Illinois Commerce Commission and was elected president of the Atlanta Gas Light Co. in 1938; until recently he also served as president of the Mobile Gas Service Corp. and Florida Public Utilities Co.

He has been a director of the American Gas Association since 1941 and in 1942 was appointed chairman of the Association's National Advertising Committee. Mr. Wolf also is serving as regional chairman of the Committee for Economic Development for the Sixth Federal Reserve District, and was instrumental in the formation of the Georgia Chapter ASM.

EMPLOYMENT SERVICE BUREAU

Address answers care of A.S.M., 7301 Euclid Ave., Cleveland 3, Ohio, unless otherwise stated.

POSITIONS OPEN

METALLURGIST: For mill in western Pa. producing hot and cold rolled stainless and alloy strip. Apply by letter stating age, education, exp., and expected salary. Box 9-5.

METALLURGIST: Young man with college training, preferably some exp. in non-ferrous processing or fabricating. Midwest copper and brass mill, control and development work. State age, exp. and salary expected. Box 9-10.

MANUFACTURER'S SALES AGENT: To represent one of the oldest manufacturers in U. S. specializing in manufacturing metal treating baths. Must have knowledge of met. and heat treat. Good territory and commissions. State name, age, education and exp. Box 9-15.

TECHNICAL OBSERVER: Elec. Furn. Melting Dept. Should be grad. chem. or met. Assist in chemical calculations on furnaces and observe furnace conditions. Some furnace exp. desirable. Box 9-20.

JUNIOR METALLURGIST: Mill control work on alloy sheet mill products. Prefer grad. met. capable of correlating lab. work and mill processing. Box 9-25.

CHEMICAL ENGR. OR METALLURGIST: Exp., for research, development and production of metal paints and pigments. Box 9-30.

APPLICATION ENGR.: Elec. heating and control equipment, Midwest. Tech. education, preferably elec. engr. with mech. talent; good personality; sales aptitude; 3 yrs. or more commercial exp.; age 26 to 35. Box 9-35.

SALESMAN: Alloy and stainless steel. Old est. steel concern, Cincinnati area. Grad. met. with mill or industrial plant exp. or equivalent. Excellent opp. for young man interested in sales. Previous sales exp. not necessary. State age, education, exp., salary expected. Box 9-40.

MATERIALS TESTING ENGR.: Exp., to set up and take complete charge of matls. testing dept. of well known powder metal products company. Required to run established phys. tests and set up new procedures for evaluating powder metal products. Salary commensurate with exp. and ability. Box 9-45.

HEAT TREAT FOREMAN: To take charge of modern and completely equipped dept. in midwestern plant. Must be able to handle men, organize work, and produce results. Excellent wages, good working conditions, and a genuine opportunity for a promising future. Box 9-210.

POSITIONS WANTED

SALES ENGR.: B.S. in Eng., 20 yrs. sales eng. exp., industrial plants in Kansas City territory on ind. and elec. eng. problems. Interested in representing mfrs. of ind. heating and control equipment, steel and malleable castings or allied lines. Box 9-50.

DESIGNER: Part-time production eng., production or product design that can be performed at residence. Tech. background, aeronautical eng., machine and tool design, and ind. met. Box 9-55.

CHEM. PROCESS ENGINEERING: Licensed prof. engrs. desire contracts as process consultants or mfrs. representatives for electroplating, heat treat., chem. treatments, and allied fields in Southern Ohio and surrounding territory. Write P. O. Box 644, Cincinnati 1, Ohio.

METALLURGIST: B.S. in Met. Eng., 4 yrs. exp. in ferrous met. Varied exp. in control, heat treat. and phys. testing of all types of steels. Naval administrative exp. in direction of large groups of men. Awaiting discharge from the service. Box 9-60.

METALLURGICAL ENGR.: Chief Met. Chicago plant now terminating. Young, progressive, able. Exp. in matls. eng., fabrication and heat treat., quality control, lab. work; ferrous and non-ferrous. Desires Chicago vicinity, chance to show ability and initiative. Box 9-65.

LABORATORY SUPERVISOR: Young, ambitious, 8 yrs. exp. production lab. Knows metallography, heat treat., fabrication, all types of lab. tests. Desires permanent position with chance to work on research problems. Box 9-70.

METALLOGRAPHER: 5 yrs. exp. Good microscopic and metallographic background. Knowledge of heat treat., failures, fabrication, and all lab. tests including darkroom work. Can supervise metals lab. Desires position in production or research dept. Box 9-75

INDUSTRIAL ENGR: Young, college trained, 12 yrs. exp. in chem., met., plastics, electronics, methods and development work. Tech. representative for field work, either U. S. or South America. Teaching and supervisory exp. Excellent knowledge of modern mfg. methods and processes, plus proven ability as an organizer. Box 9-80.

METALLURGICAL ENGINEER: Young, univ. grad. Present position met. and head of lab. leading aircraft mfr. Exp. fabrication, heat treat. and quality control, both ferrous and non-ferrous. Available immediately. Midwest or east preferred. Box 9-85.

CHIEF METALLURGIST: 14 yrs. met. exp. in steel mill, foundry, college and aircraft plant. Development work, ferrous and non-ferrous melting, met. anal. and process control, heat treat., shop problems, electroplating, investigational and consulting work. Age 38, B.S. and M.S. in met., former professor. Box 9-90.

METALLOGRAPHER - METALLURGIST: Not the swivel chair type; 12 yrs. steel & mill exp. in metallography, photography, phys. & chem. testing, quality & production control and development work. 2 yrs. as senior metallographist in research program. Age 35. Desires small company, west or southwest. Box 9-95.

METALLURGICAL AND PRODUCTION ENGR.: B. of Met. Eng., age 29, 7 yrs. steel plant exp. including open-hearth, rolling, testing, inspection, quality control, development, specifications and considerable customer contact work. Desires production work requiring sound ferrous background with small progressive company in central New York or New England. Box 9-100.

METALLURGIST: 12 yrs. diversified plant and consulting exp. in ferrous and non-ferrous met., automotive, aero, marine, and ordnance work. Specialty raw material and heat treat. phases of high production. Desires position as chief or asst. chief met. Box 9-105.

METALLURGICAL ENGINEER: B. S. Univ. of Mich. 2½ yrs. exp. in failure analyses, matl. applications and processing for large midwest aircraft mfr. Desires reliable ind. firm in east or midwest. Age 24, not subject to draft. Box 9-110.

HEAT TREATER: Sales ability. 25 yrs. practical and tech. training. Supervisor; set heat treatments and grades; successful trouble shooter, demonstrator, teacher. 5 yrs. steel selling exp. Box 9-115.

HEAT TREATER: Diversified exp. all types ferrous and non-ferrous metals including alloy, tool, stainless steels. Acquainted with modern procedures; capable of installing and maintaining complete heat treat plant. In New York City, will travel, west coast desirable. Box 9-120.

HEAT TREATER: Age 36; 15 yrs. exp. tool dressing, heat treat tools and dies, high speed steel, aluminum; carburizing, bright annealing, induction hardening. Operation and maintenance of elec., gas, salt bath, cyanide, lead pot and controlled atmosphere furn., temp. controls. Exp. as foreman and installation of heat treat equipment. Some knowledge of metallurgy. Location optional; one or two weeks' notice. Robert Eugene Hopper, Winter Garden Court, 1850 E. Van Buren, Phoenix, Ariz.

METALLURGICAL ENGR.: Age 34, B.S. 11 yrs. ind. exp., all types of heat treat, specializing in high speed and other tool steels. Also solving problems of tool failures and capable of specifying matls. Desires development work on tool steels and forgings or in production control. Box 9-125.

SUPT. HEAT TREAT AND WELDING: 2 yrs. college met.; exp. tool and die hardening, liquid carburizing, cyaniding, nitriding, brazing, induction hardening, isothermal heat treat, annealing. Available immediately. Manhattan area preferred. Box 9-130.

METALLURGIST: Age 25, B.S. in Met. Eng. Univ. of Mich. 2 yrs. as Engineering Officer in Navy. Box 9-135.

RESEARCH METALLURGIST: 33, Sc. D., 5 yrs. exp. ind. research, 4 yrs. directing met. investigations. Demonstrated ability to organize and direct research and development work. Box 9-140.

GRADUATE ENGR.: Young, aggressive, now employed as process engr. in large automotive plant. Exp. tool development, processing of machine parts, tool and jig design, inspection and production supervision. Free to travel. Box 9-145.

METALLURGICAL ENGINEER: B.S. in Met. Eng. and B.S. in Chem. Eng., Univ. of Mich. Age 25, exp. as asst. met. in forge, foundry and machine shops of aircraft engine plant. Familiar with heat treat, forgings and machined parts, salt pot furn., die-quenching, carburizing, cyaniding, nitriding and machining. Prefer investigational and development work. Box 9-150.

AMBITIOUS YOUNG MAN: 28; would like supervisory position in heat treating or similar plant. 10 yrs. exp. in annealing, carburizing, cyaniding, oil and electric high speed hardening of NE, SAE steels, salt bath and high frequency heating, induction brazing. Exp. ind. management, wages, union and personnel. Steady, reliable, initiative. Box 9-155.

METALLURGIST: 8 yrs. exp. lab. control, research, metallography, phys. testing of high speed steels, with practical exp. in heat treat. and forging. Age 32; B.S. degree. Box 9-160.

METALLURGIST: B.S. Chem. Eng. 3 yrs. exp. failure analysis, shop problems, testing and metallurgy of non-ferrous and some ferrous materials, specialized bearing alloys. Capable of planning and supervising research projects. Responsibility; individual initiative. Will consider foreign assignment. Box 9-165.

METALLURGICAL ENGR.: M.S. degree, age 27, married. 1½ yrs. ind. exp., 3½ yrs. research and development on metal forming and fabrication. Administrative exp. Desires responsible position with progressive metal forming company. Box 9-170.

HEAT TREAT SUPERVISOR: 4 yrs. college work, metallurgical training. 12 yrs. diversified exp. heat treat. ferrous and non-ferrous metals; plating, selection and recommendation of matls., production control and shop problems. Progressive, efficient. New York-New Jersey area preferred. Box 9-175.

METALLURGICAL ENGR.: B.S. 36; married. 7 yrs. exp. machine shop production problems, metallography, production heat treat., powder metal research; 5 yrs. own business. Desires permanent sales or sales-service position in stainless or alloy steel division. Foreign assignment possible. Box 9-180.

YOUNG MAN: Grad. N. Y. Military Academy, age 27. 3½ yrs. magnesium exp., production, planning and scheduling; gen. knowledge metallurgy and X-ray, non-ferrous metals; some exp. phys. test control. Box 9-185.

METALLURGIST: B.S. in Met. 1941, age 26. 6 mo. metallurgical observer, enlisted Navy 1941. 2½ yrs. commissioned service, metallurgy, aviation ordnance, gunnery. Available about 90 days; location immaterial. Box 9-190.

CHIEF MATERIALS ENGINEER: Grad. metallurgist, 15 yrs. exp. supervision of specifications, shop controls, testing labs. Knows design, production, treatment, and service problems tractors, mining machinery, steel mills. Good personality for chief engr. or consultant to top executives. Present salary $6000. Box 9-195.

METALLURGICAL ENGR.: B.S. Met. Eng., 1940. 5 yrs. exp. in open-hearth production and temperature control. Desires permanent position in non-ferrous production or metallurgical work, small concern in Northwest. Box 9-200.

METALLURGIST: Exp. development of ferrous and non-ferrous pressure tight castings; radiography; metallography, phys. testing, shop problems, report writing. 5 yrs. exp., B.A. in Chemistry. Approximate starting salary $3800. Box 9-205.

ROSTER OF ASM CHAPTER OFFICERS

Baltimore Chapter

Chairman—George M. Nauss, Crown Cork & Seal Co., Baltimore, Md.; **First Vice-Chairman**—Herbert A. Ball, Revere Copper & Brass, Inc., 1301 Wicomico St., Baltimore; **Second Vice-Chairman**—Carl A. Zapffe, Consulting Metallurgist, 6410 Murray Hill Rd., Baltimore; **Secretary-Treasurer**—N. A. Pyle, 9005 Hartford Rd., Hamilton Sta., Baltimore; **Assistant Secretary-Treasurer**—Paul A. Zalinka, Revere Copper & Brass Co., Baltimore.

Birmingham District Chapter

Chairman—C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala.; **Vice-Chairman**—W. H. Riddell, Riddell Engineering Co., Martin Bldg., Birmingham; **Secretary**—Joseph P. Flood, P. O. Box 2583, Birmingham; **Treasurer**—J. Ernest Hill, Tennessee Coal Iron & R. R. Co., Birmingham.

Boston Chapter

Chairman—R. G. Sault, Porter Forge & Furnace, Inc., 12 Beachum St., Everett, Mass.; **Vice-Chairman**—P. D. Field, Bethlehem Shipbuilding Corp., Quincy, Mass.; **Secretary-Treasurer**—H. E. Handy, Saco-Lowell Shops, Biddeford, Maine.

British Columbia Chapter

Chairman—W. O. Richmond, University of British Columbia, Mech. Engr. Dept., Vancouver, B.C., Canada; **Vice-Chairman**—D. H. Goard, Vancouver Technical School, Vancouver; **Secretary-Treasurer**—F. N. Stephens, 505 Metropolitan Bldg., Vancouver.

Buffalo Chapter

Chairman—J. D. Dickerson, Republic Steel Corp., 1175 So. Park Ave., Buffalo, N. Y.; **Vice-Chairman**—Eugene A. Gietzen, Bethlehem Steel Co., Lackawanna, N. Y.; **Secretary**—J. H. Birdsong, Buffalo Testing Labs., Inc., 37 Niagara St., Buffalo; **Treasurer**—E. M. Galbreath, 1078 Englewood Ave., Kenmore, N. Y.

Calumet Chapter

Chairman—M. A. Jones, Youngstown Sheet & Tube Co., East Chicago, Ind.; **Vice-Chairman**—I. N. Goff, Consulting Metallurgical Engineer, 3761 Polk St., Gary, Ind.; **Secretary-Treasurer**—R. B. Lucas, Carnegie-Illinois Steel Corp., Gary Works, Gary, Ind.

Canton-Massillon Chapter

Chairman—Garland M. Riegel, Republic Steel Corp., Massillon, Ohio; **Co-Chairman**—Harry C. White, United Engineering and Foundry Co., Canton; **Vice-Chairman**—Sidney W. Poole, Republic Steel Corp., Canton; **Secretary**—Louis A. Zeitz, East Ohio Gas Co., Canton; **Treasurer**—E. C. Roglin, Hoover Co., North Canton, Ohio.

Cedar Rapids Chapter

Chairman—Henry Hauseman, 501 24th Street, N. E., Cedar Rapids, Iowa; **Vice-Chairman**—R. W. May, Collins Radio Co., Cedar Rapids; **Secretary-Treasurer**—G. H. Taylor, LaPlant-Choate Mfg. Co., Cedar Rapids.

Chicago Chapter

Chairman—H. W. Highriter, Vascoloy-Ramet Corp., North Chicago, Ill.; **Vice-Chairman**—H. L. Geiger, International Nickel Co., Room 1212, 333 North Michigan Ave., Chicago; **Secretary-Treasurer**—L. J. Bohan, 80 East Jackson Blvd., Chicago; **Assistant Secretary-Treasurer**—Wm. G. Lindner, Hinsdale, Ill.

Cincinnati Chapter

Chairman—H. D. Sturges, Wright Aeronautical Corp., Lockland, Ohio; **Vice-Chairman**—A. L. Hartley, R. K. LeBlond Machine Tool Co., Cincinnati; **Secretary**—A. P. Fischer, E. F. Houghton & Co., 803 Chamber of Commerce Bldg., Cincinnati; **Treasurer**—Stanton T. Olinger, 255 Albion Place, Cincinnati.

Cleveland Chapter

Chairman—R. G. Kennedy, Jr., Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland, Ohio; **Vice-Chairman**—Harold Y. Hunsicker, Aluminum Co. of America, 2210 Harvard, Cleveland; **Secretary**—S. M. Grant, W. S. Tyler Co., 3615 Superior Ave., Cleveland; **Treasurer**—Warren A. Silliman, Oliver Corp., Euclid & E. 193rd St., Euclid, Ohio.

Columbus Chapter

Chairman—E. K. Fry, Curtiss Wright Corp., Columbus, Ohio; **Vice-Chairman**—C. F. Lucks, Battelle Memorial Institute, 505 King Ave., Columbus; **Secretary**—R. E. Christin, Columbus Bolt Works, Columbus; **Treasurer**—Walter Hobbs, Ranco, Inc., Columbus.

Dayton Chapter

Chairman—Lawrence L. Jaffe, Frigidaire Corp., Dayton, Ohio; **Vice-Chairman**—Roger Edmonson, Harris-Seybold-Potter Co., Dayton; **Secretary**—Chester L. Gillum, The Dayton Power & Light Co., Dayton; **Treasurer**—Stewart De Poy, Delco Products Div., G.M.C., Dayton.

Detroit Chapter

Chairman—R. W. Roush, Timken Detroit Axle Co., 100-400 Clark Ave., Detroit, Mich.; **Vice-Chairman**—E. H. Stilwill, 18279 Santa Barbara, Detroit; **Secretary-Treasurer**—W. G. Patton, Climax Molybdenum Co., Detroit.

Eastern New York Chapter

Chairman—W. A. Reich, General Electric Co., Schenectady, N. Y.; **Vice-Chairman**—T. Yates Wilson, Allegheny Ludlum Steel Corp., Watervliet, N. Y.; **Secretary-Treasurer**—Constance B. Brodie, General Electric Co., Research Laboratory, Schenectady.

Fort Wayne Chapter

Chairman—R. J. McCracken, Durham Mfg. Corp., Ft. Wayne, Ind.; **Vice-Chairman**—F. C. Lehman, Joslyn Mfg. & Supply Co., Fort Wayne; **Secretary**—W. E. Gifford, Magnavox Co., Ft. Wayne; **Treasurer**—H. A. McAninch, Warner Automotive Parts Div., Auburn, Ind.

Georgia Chapter

Chairman—O. K. Weatherwax, Gulf Oil Co., Hurt Bldg., Atlanta, Ga.; **Vice-Chairman**—W. P. Rocker, Southern Spring Bed Co., 290 Hunter St. S. E., Atlanta; **Secretary**—M. F. Wiedl, Bell Aircraft, Inc., 2217 Virginia Place N. E., Atlanta; **Treasurer**—F. D. Brosnan, Scripto Mfg. Co., 425 Houston St., Atlanta.

Boston Chapter Chairman John T. Norton presents the gavel to his successor, R. G. Sault, whose father was chairman in 1922.

Golden Gate Chapter

Chairman—John Dorn, University of California, Berkeley, Calif.; **Vice-Chairman**—Ed. E. Hudson, Western Forge & Tool Works, Oakland; **Secretary**—H. E. Krayenbuhl, Oliver United Filters, 2900 Glascock St., Oakland; **Treasurer**—Frank B. Drake, Johnson Gear & Mfg. Co., Ltd., 8th & Parker Sts., Berkeley.

Hartford Chapter

Chairman—John A. Swift, 155 N. Whitney St., Hartford, Conn.; **Vice-Chairman**—Ovide G. Hogaboom, 27 Hart St., New Britain, Conn.; **Secretary-Treasurer**—D. A. Tullock, Jr., Holo-Krome Screw Corp., Hartford.

Indianapolis Chapter

Chairman—P. F. Ulmer, Link-Belt Co., Indianapolis, Ind.; **Vice-Chairman**—R. W. Stahl, 724 K. of P. Bldg., Indianapolis; **Secretary**—A. J. Newsom, Schwitzer-Cummins Co., 1125 Massachusetts Ave., Indianapolis; **Treasurer**—Axel Weydell, 1545 North Gale St., Indianapolis.

Inland Empire Chapter

Chairman—C. S. Mercer, W. 1115-15th Ave., Spokane, Wash.; **Vice-Chairman**—J. K. Mullen, W. 404 27th Ave., Spokane; **Secretary-Treasurer**—Albert Gruber, Washington Water Power Co., 825 Trent Ave., Spokane.

Kansas City Chapter

Chairman—L. B. Morrell, 418 Greenway Terrace, Kansas City, Mo.; **Vice-Chairman**—Kenneth B. Bly, 810 W. 27th St., Independence, Mo.; **Secretary-Treasurer**—G. S. Young, Kansas City Power & Light Co., P. O. Box 679, Kansas City.

Lehigh Valley Chapter

Chairman—T. G. Foulkes, Bethlehem Steel Co., Bethlehem, Pa.; **Vice-Chairman**—A. O. Crobaugh, 18 Gardner Court, Washington, N. J.; **Secretary-Treasurer**—R. L. Deily, Bethlehem Steel Co., Bethlehem, Pa.

Los Angeles Chapter

Chairman—P. D. McElfish, Kilsby-Graham Co., Standard Oil Bldg., Los Angeles, Calif.; **Vice-Chairman**—F. Robbins, Plomb Tool Co., 2209 Santa Fe Ave., Los Angeles; **Secretary-Treasurer**—W. J. Parsons, Pacific Scientific Co., 1430 Grande Vista, Los Angeles.

Louisville Chapter

Chairman—Raymond B. Smith, Reynolds Metals Co., Plant No. 7 & 8, Louisville, Ky.; **Vice-Chairman**—S. F. Popson, 521 Eline Ave., Louisville; **Secretary-Treasurer**—A. S. Coffinberry, Tube Turns, Inc., 659 S. 9th St., Louisville.

Mahoning Valley Chapter

Chairman—Thomas E. Eagan, Cooper-Bessemer Corp., Grove City, Pa.; **Vice-Chairman**—Myron A. Hughes, 417 Broadway, Youngstown, Ohio; **Secretary - Treasurer**—Howard Dunkle, 276 Cadillac Dr., Youngstown.

Manitoba Chapter

Chairman—Harold J. Farrow, Standard Aero Engine Works Ltd., Stevenson Airfield, Winnipeg, Manitoba, Canada; **Vice-Chairman**—Chas. Hovey, University of Manitoba, Fort Garry, Manitoba; **Secretary-Treasurer**—E. M. Evans, 706 Sherbrook St., Winnipeg.

Milwaukee Chapter

Chairman—John Jarman, Allis-Chalmers Mfg. Co., West Allis, Wis.; **Vice-Chairman**—Edward Wellauer, The Falk Corp., Wauwatosa, Wis.; **Secretary-Treasurer**—E. G. Guenther, Wisconsin Motor Corp., Milwaukee.

Missouri School of Mines Chapter

Secretary-Treasurer—D. F. Walsh, Missouri School of Mining and Metallurgy, Rolla, Mo. (Other officers to be elected in fall.)

Montreal Chapter

Chairman—C. K. Lockwood, Shawinigan Chemicals Ltd., Power Bldg., Montreal, P. Q. Canada; **Vice-Chairman**—S. B. McRobert, McRobert Spring Service Ltd., Montreal; **Secretary**—Mrs. B. W. McGillivray, P. O. Box 371—Station "H," Montreal; **Treasurer**—K. J. Barwick, Henderson-Barwick Co., Ltd., Montreal.

Muncie Chapter

Chairman—J. D. McNair, Indiana Steel & Wire Co., Muncie, Ind.; **Vice-Chairman**—Walter McCormack, R. R. No. 1, Spiceland, Ind.; **Secretary - Treasurer** — John Sherry, Warner Gear Div., Muncie.

New Haven Chapter

Chairman—L. A. Ward, Chase Brass & Copper Co., Waterbury, Conn.; **Vice-Chairman**—R. M. Brick, 14 Mansfield St., New Haven, Conn.; **Secretary**—H. C. Irving, Bridgeport Brass Co., Bridgeport, Conn.; **Treasurer**—Stuart E. Sinclair, Geometric Tool Co., Blake & Valley St., New Haven, Conn.

New Jersey Chapter

Chairman—David A. Butler, 295 Hyslip Ave., Westfield, N. J.; **Vice-Chairman**—Willard L. Hults, 23 South Mountain Ave., Millburn, N. J.; **Secretary**—T. G. Gilley, 4 Frazer Place, Cranford, N. J.; **Treasurer** — R. W. Thorne, Bennett Insured Steel Treating Co., 246 Raymond Blvd., Newark, N. J.

New York Chapter

Chairman—G. K. Herzog, Electro Metallurgical Co., 30 East 42nd St., New York, N. Y.; **Vice-Chairman**—R. F. Vines, Ford Instrument Co., Rawson St. & Nelson Ave., Long Island City, N. Y.; **Secretary**—Hanson S. Lewis, International Nickel Co., 67 Wall St., New York City; **Treasurer**—H. C. Bostwick, 40 Wall St., Room 2410, New York City.

North Texas Chapter

Chairman—C. F. Dominy, 6420 Darwood, Fort Worth, Texas; **Vice-Chairman**—Robert A. Stewart, 2724 Amherst, Dallas; **Secretary-Treasurer**—R. A. Peterson, 1210 Hendricks Ave., Dallas.

North West Chapter

Chairman—A. A. Gustafson, E. F. Houghton & Co., 2645 University Ave., St. Paul. Minn.; **Vice-Chairman**—Gordon W. Johnson, American Hoist & Derrick Co., 63 S. Robert St., St. Paul; **Secretary-Treasurer**—Alexis Caswell, 200 Builders Exchange Bldg., Minneapolis.

Northwestern Pennsylvania Chapter

Chairman—James E. Lewis, Raymond Mfg. Co., Corry, Pa.; **Vice-Chairman**—Herbert E. Weber, Universal-Cyclops Steel Co., Titusville, Pa.; **Secretary-Treasurer**—Carl E. Blass, Talon, Inc., Meadville, Pa.

Notre Dame Chapter

Chairman—Henning Klouman, Michiana Products Corp., Michigan City, Ind.; **Vice-Chairman**—Herbert Habart, 1135 Bronson St., South Bend, Ind.; **Secretary**—E. G. Mahin, Department of Metallurgy, University of Notre Dame, Notre Dame, Ind.; **Treasurer**—R. D. Wysong, The Studebaker Corp., South Bend, Ind.

Ontario Chapter

Chairman—R. D. Fraser, Burlington Steel Co., Ltd., Hamilton, Ont.; **Vice-Chairman**—A. B. Lawrason, Eureka Planter Co., Ltd., Woodstock, Ont.; **Secretary**—J. L. Balleny, Canadian General Electric Co., Ltd., Toronto; **Treasurer**—H. Thomasson, 162 Rothsay Ave., Hamilton.

Oregon Chapter

Chairman—John Comfort, Pacific Metal Co., 803 N. W. Park Ave., Portland, Ore.; **Vice-Chairman**—H. H. Hewitt, Jr., Steel Tank & Pipe Co., Portland; **Secretary-Treasurer**—Rex DeLong, 4020 N. E. Wistaria Dr., Portland.

Ottawa Valley Chapter

Chairman—H. H. Scotland, Inspection Board of United Kingdom & Canada, Ottawa, Ont.; **Vice-Chairman**—Morris Lambe, Ottawa Car & Aircraft Co., Ottawa; **Secretary-Treasurer**—Edwin Marshall, 4 Fisher Ave., Ottawa; **Honorary Chairman**—E. G. Patterson, Ottawa Car & Aircraft Ltd., 301 Slater St., Ottawa; **Honorary Treasurer**—Morris Lambe.

Penn State Chapter

Chairman—H. B. Northrup, 319 Mineral Industries Bldg., State College, Pa.; **Vice-Chairman**—C. R. Austin, Meehanite Metal Corp., New Rochelle, N. Y.; **Secretary-Treasurer**—D. F. McFarland, Metallurgy Department, Penn State College, State College; **Recording Secretary**—H. M. Davis, Penn State College, State College, Pa.

Peoria Chapter

Chairman—G. C. Thiersch, 704 Albany St., Peoria, Ill.; **Vice-Chairman**—D. J. Wright, 510 W. Richwoods Blvd., Peoria; **Secretary-Treasurer**—Matthew C. Aljanich, 1115 Seneca Place, Peoria.

Philadelphia Chapter

Chairman—L. E. Ekholm, Alan Wood Steel Co., Conshohocken, Pa.; **Vice-Chairman**—Edward A. Snader, 182 Windemere Ave., Lansdowne, Pa.; **Secretary**—Frederick Cooper, Wilson Steel and Tool Co., Philadelphia; **Treasurer**—W. M. Harbaugh, Jr., Ordnance Dept., Frankford Arsenal, Philadelphia.

Pittsburgh Chapter

Chairman—L. W. Oswald, Carnegie-Illinois Steel Corp., 774 Frick Bldg., Annex, Pittsburgh, Pa.; **Vice-Chairman**—Chas. F. Pogacar, 416 Olympia Rd., Mt. Washington, Pittsburgh; **Secretary-Treasurer** — H. L. Walker, Box 6621, N. S. Sta., Pittsburgh.

Pueblo Group

Chairman—J. R. Zadra, Colorado Fuel & Iron Corp., Pueblo, Colo.; **Vice-Chairman**—Rudolph Smith, Colorado Fuel & Iron Corp., Pueblo; **Secretary-Treasurer**—Howell Drummond, 1225 Beulah Ave., Pueblo.

Puget Sound Chapter

Chairman—Charles F. Metzger, Campbell Hardware & Supply Co., 100 First South, Seattle, Wash.; **Vice-Chairman**—Ralph Winship, Columbia Steel Co., 1331 Third Ave. Bldg., Seattle. **Secretary-Treasurer**—S. C. Gillespie, Western Gear Works, 9th Ave. South & King St., Seattle.

Rhode Island Chapter

Chairman—C. B. Rex, 74 Kay Blvd., Newport, R. I.; **Vice-Chairman**—Howard G. Jones, Socony-Vacuum Oil Co., Inc., P. O. Box 1502, Providence, R. I.; **Secretary-Treasurer**—Carl G. Peterson, Providence Gas Co., Providence; **Recording Secretary**—L. E. Wagner, Providence Gas Co., Providence.

Rochester Chapter

Chairman—Vernon H. Patterson, Bausch & Lomb Optical Co., Rochester, N. Y.; **Vice-Chairman**—E. L. Spanagel, Rochester Gas & Electric Corp., 89 East Ave., Rochester; **Secretary - Treasurer** — N. J. Finsterwalder, Taylor Instrument Co., 95 Ames St., Rochester.

Rockford Chapter

Chairman—Carl Muehlemeyer, A. T. Muehlemeyer Heat Treating Co., Rockford, Ill.; **Vice - Chairman** — Everett Magnuson, Eclipse Fuel Engineering Co., 711 So. Main St., Rockford; **Secretary-Treasurer**—H. E. Habecker, Mattison Machine Works, Rockford.

Rocky Mountain Chapter

Chairman—Bruce B. La Follette, U. S. Mint, Denver, Colo.; **Vice-Chairman**—R. Wayne Parcel, Denver & Rio Grande Western Railroad Co., Denver; **Secretary**—J. F. Musgrove, Denver & Rio Grande Western R. R. Co., Denver; **Treasurer**—J. K. Garretson, 324 Continental Oil Bldg., Denver, Colo.

Saginaw Valley Group

Chairman—E. R. Wilson, 1213 Welch Blvd., Flint, Mich.; **Vice-Chairman**—M. J. Caserio, 514 E. Kearsley St., Flint; **Secretary-Treasurer**—A. H. Karpicke, 1933 Wilkins St., Saginaw, Mich.

San Diego Chapter

Chairman—M. E. Tatman, 3824 Fourth Ave., San Diego; **Vice-Chairman**—W. G. Hubbell, 4654 Soria Dr., San Diego; **Secretary-Treasurer**—W. Howard Hill, Jr., 3884 Division St., San Diego.

Southern Tier Chapter

Chairman—J. Donald MacQueen, International Business Machines Corp., Endicott, N. Y.; **Vice-Chairman**—Joseph O. Jeffrey, Cornell University, Ithaca, N. Y.; **Secretary - Treasurer** — James S. Meyer, International Business Machines Corp., Endicott.

Springfield Chapter

Chairman—Howard E. Boyer, American Bosch Corp., Springfield, Mass.; **Vice-Chairman**—Charles S. Leonard, 366 Grove St., Chicopee Falls, Mass.; **Secretary-Treasurer**—Henry H. Jones, 79 Hawthorne St., Longmeadow, Mass.; **Assistant Secretary-Treasurer**—Daniel J. Clini, 30 Belmont Ave., Springfield.

St. Louis Chapter

Chairman—Rex Deghuee, Bethlehem Steel Co.; Bell Telephone Bldg., 1010 Pine St., St. Louis, Mo.; **Vice-Chairman**—M. M. Holtgrieve, Hubbell & Co., 2817 Laclede, St. Louis; **Secretary-Treasurer**—S. B. Knutson, Standard Steel Spring Co., Gear & Axle Div., Madison, Ill.

Syracuse Chapter

Chairman—Fay Adkinson, Syracuse Heat Treating Co., Syracuse, N. Y.; **Vice-Chairman**—Karl W. Robertson, Minneapolis Honeywell Regulator Co., Syracuse; **Secretary**—J. G. MacAllister, Syracuse Heat Treating Co., Syracuse; **Treasurer**—Walter Hodapp, Crucible Steel Co. of America, Syracuse.

Texas Chapter

Chairman—W. E. Burndrett, Hughes Tool Co., Houston, Texas; **Vice-Chairman**—Glenn R. Ingels, Cook Heat Treating Co., Houston; **Secretary - Treasurer** — H. Ben Young, Jr., Mission Manufacturing Co., P. O. Box 4029, Houston.

Toledo Group

Chairman—Herman Guenther, 3411 Alexis Rd., Toledo, Ohio; **Vice-Chairman**—Fred W. Lutz, 523 Highland Ave., Toledo; **Secretary-Treasurer**—Orville E. Cullen, 2649 Oak Grove Pl., Toledo.

Tri-City Chapter

Chairman—Russell Swartz, Ordnance Steel Foundry, Bettendorf, Iowa; **Vice-Chairman**—T. L. Burkland, John Deere Harvester Works, East Moline, Ill.; **Secretary-Treasurer**—James C. Erickson, John Deere Plow Works, Moline, Ill.

Tulsa Chapter

Chairman—Walter O'Bannon, Jr., Walter O'Bannon Co., Box 2477, Tulsa, Okla.; **Vice-Chairman**—L. W. Cashdollar, Hinderliter Tool Co., Tulsa; **Secretary-Treasurer**—K. L. Kimball, 2944 S. Cincinnati, Tulsa.

Warren Chapter

Chairman—L. Y. Deuchler, Youngstown Pressed Steel Div. of Mullins Manufacturing Corp., Warren, Ohio; **Vice-Chairman**—E. W. Husemann, Copperweld Steel Co., Warren; **Secretary-Treasurer**—I. A. Oehler, American Welding & Mfg. Co., 395 Kenmore, S. E., Warren.

Washington Chapter

Chairman—T. G. Digges, National Bureau of Standards, Washington, D. C.; **Vice-Chairman**—A. F. Campbell, Timken Roller Bearing Co., Washington; **Secretary-Treasurer**—John A. Bennett, Bureau of Standards.

West Michigan Chapter

Chairman—Russell L. Edison, 444 Paris Ave., S. E., Grand Rapids, Mich.; **Vice-Chairman**—Harry L. Campbell, 1600 Robinson Rd., S. E., Grand Rapids; **Secretary**—Donald A. Paull, 1261 West Dale Ave., Muskegon, **Treasurer**—R. C. Fox, 394 Houston Ave., Muskegon.

Wichita Chapter

Chairman—J. T. Phillips, 301 N. Manor Rd., Wichita, Kans.; **Vice-Chairman**—Earl Krasser, 544 S. Hillside, Wichita; **Secretary** — Norris Brown, Western Technical Supply Co., Wichita; **Treasurer**—R. N. St. John, Coleman Lamp and Stove Co., Wichita.

Worcester Chapter

Chairman—J. Adams Holbrook, Washburn Shops Worcester Polytechnic Institute, Worcester, Mass.; **Vice-Chairman**—Arnold L. Rustay, Wyman-Gordon Co., Worcester; **Secretary-Treasurer**—George H. Campbell, Pratt and Inman, Worcester; **Assistant Secretary-Treasurer**—H. A. Edberg, Progressive Tool & Die Co., Worcester.

York Chapter

Chairman—Chas. F. Feiser, Jr., 103 S. Queen St., York, Pa.; **Vice-Chairman**—John F. Cotton, 1517 Letchworth Rd., Highland Park, Camp Hill, Pa.; **Secretary**—Chas. M. Strickler, General Machine Wks., York; **Treasurer**—H. I. Hartman, 638 W. King St., York; **Honorary Chairman**—Charles M. Strickler.

Jos. T. Sullivan Joins MacDermid Inc.

MacDermid, Inc., announces the appointment of Joseph T. Sullivan as technical sales representative for Northern Massachusetts, Maine, Vermont, and New Hampshire.

J. T. Sullivan

Mr. Sullivan is a graduate of Yale Engineering School, where he received his B.S. degree in Metallurgy in 1934. In 1935 he joined the New Haven Clock Co. as assistant chemist in their laboratory and subsequently was made chief chemist in charge of all metal finishing departments. He is a member and past president of the New Haven Branch of the American Electroplaters Society, and is also a member of the ASM.

Arden Knight Returns to Braeburn Sales Force

Braeburn Alloy Steel Corp. has appointed Arden L. Knight, a past chairman of the Boston Chapter ASM, as eastern New England sales manager. He returns to this territory after 3½ years' service in the United States Navy.

Named Advertising Director for DoAll

E. R. Haan, technical editor of *Popular Mechanics* Magazine for many years, has been appointed director of advertising of the DoAll Co., Des Plaines, Ill.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Oct. 15	Engineers Club	F. G. Tatnall	Metallurgy and Engineering Work Together in Postwar
Boston	Oct. 5	Hotel Sheraton	P. Payson	A Modern Viewpoint of the Annealing of Steel
Buffalo	Oct. 11	Hotel Statler	J. O. Almen	Effect of Residual Stresses on the Fatigue Strength of Structural Materials
Cedar Rapids	Oct. 8	Iowa City		Joint Meeting With Tri-City Chapter
Chicago	Oct. 11	Chicago Bar Assoc.	Irving N. Burr	Statistical Analysis as an Aid in Metallurgical Control
Cleveland	Oct. 1	Cleveland Club	A. P. Seasholtz	Conventional and Interrupted Quenching in Heat Treatment of Steel
Columbus	Oct. 9	Ft. Hayes Hotel	N. K. Koebel	Industrial Controlled Atmospheres
Dayton	Oct. 10	Engineers Club	F. G. Tatnall	Experimental Stress Analysis
Detroit	Oct. 15	Rackham Bldg.	W. Jominy	Woodside Memorial Lecture
Eastern N. Y.	Oct. 9	Jack's Restaurant	W. W. Edens	Centrifugal Casting
Ft. Wayne	Sept. 25	Chamber of Commerce	A. E. Focke	Tempering
Georgia	Oct. 1	Atlanta	J. P. Flood	Oxy-Acetylene Welding and Cutting
Golden Gate	Oct. 15			
Indianapolis	Oct. 15	Canary Cottage	W. R. Chapin	Some Observations in the Heat Treatment of Steel
Lehigh Valley	Oct. 5	Bethlehem, Pa.	T. G. Foulkes	Metallurgical Highlights of European Trip
Los Angeles	Sept. 27	Scully's Restaurant	T. L. von Planck	Desirable Properties for Steel Fabrication
Los Angeles	Oct. 25	Scully's Restaurant	A. R. Wynn	Welding and Brazing
Manitoba	Oct. 11	Marlborough Hotel, Winnipeg	J. deBondy	Various Cast Steels and Their Microstructures
Milwaukee	Oct. 16	Milwaukee Athletic Club	W. A. Hambley	Cast Iron
Montreal	Oct. 1		Gordon Cape	Welding
Muncie	Oct. 9			Springs and Spring Materials
New Jersey	Oct. 15	Newark	Carter Cole	New Developments in Copper and its Alloys
New Haven	Oct. 25	Connecticut Light & Power Auditorium, Waterbury	R. M. Baker	Induction Heating of Non-Ferrous Alloys and Plastics
North West	Oct. 11	Coffman Memorial Union, Univ. of Minn.	A. J. Scheid, Jr.	Selection and Heat Treatment of Tool Steel
Northwest Pa.	Sept. 27	Erie, Pa.	H. J. Stagg	Heat Treatment by TTT-Curves
Northwest Pa.	Oct. 25	Titusville, Pa.		High Temperature Steels
Notre Dame	Oct. 10		Robert F. Mehl	Impressions of World-wide Metallurgy
Ontario	Oct. 5	Hamilton	W. E. Loosley	Manufacture of Tin Plate
Peoria	Oct. 8	Jefferson Hotel		Production Planning
Philadelphia	Sept. 28	Temple University		Symposium on Metallurgy
Philadelphia	Oct. 26	Engineers' Club	J. W. Cable, H. B. Osborn Jr., Otto Weitman	Induction Heating
Pittsburgh	Oct. 11	Roosevelt Hotel	F. G. Tatnall	The Relation Between Engineering, Metallurgy, and Materials Specifications
Pueblo Group	Oct. 18	Towne Room, Whitman Hotel	Edgar C. Bain	Principles for Selection of New Steels
Rochester	Oct. 8	Lower Strong Auditorium, University of Rochester	A. O. Schaefer	Recent Experiences in Large Forging
Rockford	Oct. 17	Faust Hotel	H. G. Williams	Beryllium-Copper in Postwar Product Design
Saginaw Valley	Oct. 16		Wm. J. Hale	The Shape of Things to Come
Southern Tier	Oct. 8	Mark Twain Hotel, Elmira, N. Y.	J. P. Gill	Modern High Speed Steels
Springfield (Mass.)	Oct. 15	Hotel Adna Brown Springfield, Vt.	Ray Kells, Leonard Grimshaw	Selection and Heat Treatment of Tool Steels
St. Louis	Oct. 19	York Hotel		Drop Forgings
Syracuse	Oct. 2	Onondaga Hotel	B. L. McCarthy	Grain Size
Texas	Oct. 11	"Williams"	J. D. Hanawalt	Magnesium
Tri-City	Oct. 8	Iowa City		Joint Meeting with Cedar Rapids Chapter
Warren	Oct. 11	Odd Fellows Hall	V. T. Malcom	Castings of Various Metals
West Michigan	Oct. 15		C. R. Foreman	Heat Treating in Salt Baths
Worcester	Oct. 10	Hotel Sheraton	B. L. McCarthy	Wire

A.S.M. REVIEW OF CURRENT METAL LITERATURE

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio, During the Past Month. Prepared by Thelma Reinberg, Librarian.

1. ORES & RAW MATERIALS

Production: Mining; Beneficiation

1-32. **Design and Operation of Modern Sintering Plants.** *Industrial Heating*, v. 12, July '45, pp. 1157-1158.
Design and operation of plants and type of sintering machine.

1-33. **The Production of Magnesium—Part I.** *Industrial Chemist*, v. 21, July '45, pp. 351-358.
Survey of the process developed by Magnesium Elektron Limited. Thermal balance of components; "classical" process; chlorinator reactions; electrolysis; subsequent developments; pellet form mix; elimination of peat.

1-34. **The Alumina Problem in Peace and War.** Francis C. Frary. *Chemical & Engineering News*, v. 23, Aug. 10, '45, pp. 1324-1327.
To produce 1 lb. of aluminum it is necessary first to produce two of alumina. Increases in aluminum capacity brought on by war bring up questions of raw materials and processes. Bayer process; use of other raw materials; other processes; alunite; aluminum for aircraft. 9 ref.

2. SMELTING AND REFINING

2-84. **The Oxidation and Evaporation of Magnesium at Temperatures from 400° to 500° C.** Earl A. Gulbransen. Electrochemical Society, Preprint 87-33, 11 pp.
Vacuum microbalance technique is used for the study of the oxidation and evaporation of magnesium at temperatures from 400 to 500° C. and at several pressures. The curves obtained consist of an initial evaporation period, an oxidation period, and a final evaporation period. The oxidation curves at temperatures of 475° C. and higher are linear with time of oxidation.

2-85. **Alsifer and How to Use It.** *Vancoram Review*, v. 4, Spring '45, pp. 16-17.
What Alsifer is; melting temperature; density; purity; deoxidizing power; products of deoxidation; grain size control; general; open hearth; electric furnace.

2-86. **Magnesium by the Carbothermic Process.** Gerald E. Stedman. *Metals & Alloys*, v. 22, July '45, pp. 102-106.
Calcined dolomite converted to magnesia and the latter reduced by carbon while heated in low pressure or vacuum retorts. Comprehensive description of Kaiser's plant and process at Permanente.

2-87. **Zinc Recovery.** W. T. Isbell and C. C. Long. *Metal Industry*, v. 67, July 6, '45, pp. 7-8.
Direct production of metal from lead blast furnace slag.

2-88. **Basic Slags and Dephosphorization.** Frank G. Norris. *Metal Progress*, v. 48, Aug. '45, pp. 291-296.
Review of: The Constitution of Basic Steel Furnace Slags, by J. R. Rait and H. J. Goldschmidt; A Study of the Basic Open-Hearth Process, With Particular Reference to Slag Constitution, by A. H. Jay; The Phosphorus Reaction in Basic Open-Hearth Practice, by Y. K. Zea.

2-89. **Process Control in the Production of Sulphur Steel.** G. A. Ferris and H. Clark. *Iron & Steel Engineer*, v. 22, July '45, pp. 37-45.
Benefits derived from a controlled process of manufacture in producing semi-finished billets of low carbon free-cutting steels in the open-hearth. The relative importance of open-hearth, soaking pit, and blooming mill practice is discussed.

2-90. **Vacuum Metallurgy.** W. J. Kroll. *Canadian Metals & Metallurgical Industries*, v. 8, July '45, pp. 26-30.
Methods and applications of melting and evaporating metals in a vacuum. 29 ref.

2-91. **Effect on Yield of Medium Carbon, Semi-Killed Steel.** E. C. Sorrells. *Blast Furnace & Steel Plant*, v. 33, July '45, pp. 843, 848.
Factors which affect surface and yield of medium carbon, semi-killed steel are: Melting and deoxidation to obtain proper ingot structure and surface, sulphur content, mold design, temperature and rate of pour, proper soaking pit heating practice. Uniform results can be obtained in ingot structure from heat to heat if melt carbon, slag control, carbon drop, temperature at tap, carbon at tap, amount of deoxidizer used in teeming are controlled.

2-92. **Method for Producing Low Carbon Pig Iron.** A. Denison Williams. *Blast Furnace & Steel Plant*, v. 33, July '45, pp. 849-851.
Conventional circular blast furnace is converted to produce low carbon pig iron.

2-93. **Open-Hearth Furnace Operation and Maintenance, II.** *Industrial Heating*, v. 12, July '45, pp. 1200, 1202, 1204.
Substitutes for fluorspar and the use of cupola iron in the open-hearth charge.

3. PROPERTIES OF METALS AND ALLOYS

3-130. **Reinforced Cast Iron.** R. Bertschinger. *Schweizer Archiv*, v. 10, no. 7, July '44, pp. 195-203. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 273-277.
Compressive strength of cast iron is greatly superior to its tensile strength and may be five to six times as large as the latter. Other considerations are the improvement of the elasticity of cast iron in order to obtain a product which combines the favorable sliding friction properties of cast iron with a good degree of resiliency.

3-131. **Alloy Cast Iron Developments.** Marcel Guedras. *Mecanique*, no. 322, Feb. '44, pp. 39-42. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 277-279.
Alloying elements and their effect on graphitization; use of alloy cast irons in engineering; resistance to chemical agents; manufacture of alloy cast irons.

Materials Index

THE FOLLOWING tabulation classifies the articles annotated in the ASM Review of Current Metal Literature according to the metal or alloy concerned. The articles are designated by section and number. The section number appears in bold face type and the number of the article in light face.

General Ferrous

2-85-88-92; **3**-138; **5**-33; **21**-66; **26**-121.

Cast Iron

3-130-131-133-134; **9**-100; **14**-224-232-237; **15**-27-28; **27**-124.

Cast Steel

3-147; **12**-152; **14**-225-237-253.

Wrought Carbon Steel

2-89; **6**-103; **16**-101; **19**-223-229; **22**-409.

Alloy Steel

3-144-147; **6**-93; **16**-101; **22**-416-458; **23**-195-204.

Stainless and Heat Resisting Steel

3-141-145; **7**-184-186; **8**-101; **19**-219; **22**-424-429-439-448-449; **23**-214.

Tool Steels and Carbides

5-31-38; **18**-182-185-188-201; **19**-244; **20**-308-309-335-351-357; **23**-197.

General Non-Ferrous

11-55; **14**-223-238; **19**-231; **21**-67; **22**-418; **26**-124.

Aluminum

1-34; **3**-132-137-148; **6**-91-92-98-101-109; **7**-166-169-178-180-187; **9**-96-97; **10**-63-68; **12**-149-160-175; **14**-244; **15**-30; **16**-104; **18**-194-199; **19**-217-227-238-242; **20**-356; **22**-435-460; **23**-187-188-190-193-196-198-199-205-207-208-209; **26**-122-123-125.

Magnesium

1-33; **2**-24-86; **3**-142; **4**-50-51-52-53; **6**-91-98-99; **7**-182; **9**-95; **12**-160-173; **14**-221-227-233-244-247-248-252-254-256; **18**-183-184-190; **19**-221-248; **22**-450; **23**-201; **24**-66; **26**-119-122-123-125-126.

Copper, Brass and Bronze

3-136-143-146; **8**-99; **9**-102; **13**-29; **14**-229-250; **19**-243-249; **22**-441; **23**-210; **26**-120.

Nickel, Monel and Nickel Alloys

6-108; **8**-103; **10**-63.

Lead and Lead Alloys

19-231; **21**-63.

Tin and Tin Alloys

14-250; **23**-187; **26**-118.

Zinc and Zinc Alloys

2-87; **6**-95; **8**-101; **10**-66; **12**-160; **13**-27; **16**-107; **19**-219; **23**-210.

Miscellaneous and Minor Metals

3-135; **5**-32; **7**-170-185; **22**-459.

3-132. **Cast Alloy Alufont-3.** R. Irmann. *Technische Rundschau*, v. 36, '44, no. 29, p. 1; no. 30, p. 2; no. 31, p. 3. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 285-289.
Aluminum-magnesium alloys Peraluman-3 and Peraluman-5 possess excellent corrosion resistance to sea water, but only average mechanical strength. Higher strength and good corrosion resistance are combined in the Anticorodal and Silumin alloys. Alufont-3 possesses the identical strength as Anticorodal and Silumin but combines a far superior elongation with a somewhat lower yield point.

3-133. **Strong, Light Iron Castings.** W. M. Albrecht. *Metals & Alloys*, v. 21, June '45, pp. 1631-1636.
Structurally a cross between a pearlitic malleable iron and a spheroidized high carbon steel, the cast engineering material known as "Z-Metal" offers an interesting combination of properties to the designer and has developed many important applications which are reviewed.

3-134. **Engineering Properties of Malleable Iron Castings.** *Metals & Alloys*, v. 21, June '45, pp. 1667, 1669.
Types; engineering specifications; heat treatments; properties; trade names.

3-135. **The Solubility of Certain Metals in Gold.** E. A. Owen and E. A. O'Donnell Roberts. Institute of Metals *Journal*, v. 12, May '45, pp. 213-254.
Purpose of the investigation was to obtain data, concerning maximum solid solubility, which could be compared with those obtained with copper and silver, with a view to arriving at a better understanding of the phenomena that occur when metals alloy with one another. Deals with only small portions of most of the equilibrium diagrams of the alloy systems concerned, as attention is directed solely to the α-solid solutions. Solutions in gold of the following elements have been examined: Beryllium, aluminum, zinc, gallium, germanium, arsenic, cadmium, indium, tin, antimony, mercury, lead, and bismuth. 24 ref.

3-136. **The Effect of Some Variations in Melting Procedure on the Properties of High Tin Bronze Chill-Cast Under Controlled Conditions.** W. T. Pell-Walpole. Institute of Metals *Journal*, v. 12, May '45, pp. 267-277.
Effects of some variations in melting conditions and procedure on the properties of small strip ingots of 14% tin bronze, chill-cast under closely controlled conditions. The high tin content was selected as being near to the limit of the normal working range (α solid solution) and therefore likely to be most sensitive to the effects of such variations. 5 ref.

3-137. **Aluminum-Base Casting Alloys (Materials Work Sheet).** *Machine Design*, v. 17, July '45, pp. 149-153.
Properties; constants; characteristics; applications; fabrication; resistance to corrosion; galvanic corrosion; analyses; material designations.

3-138. **The Examination of a Rimming-Steel Ingot Containing 0.2% of Carbon.** T. Swinden. *Blast Furnace & Steel Plant*, v. 33, July '45, pp. 835-837.
Ingot of 0.29% carbon steel has several features which differ from those of a normal low carbon rimming-steel ingot, such as the unusual appearance of the rimming action, the presence of columnar crystals and the variation in carbon content; provides a definite answer to the question as to whether the iron in the rim portion has been deposited as β-iron. (From British Iron & Steel Institute).

3-139. **Only a Diamond Is Harder.** *Compressed Air Magazine*, v. 50, July '45, p. 192.
"Norbide" is a superior material for lining nozzles used in pressure blasting with sand, steel, grit, or other abrasives, for which it is especially suited because of its great resistance to abrasion; in lapping or polishing of metal parts it acts as an abrasive.

3-140. **Metallurgy of Foreign Automotive Material.** J. H. Frye. *SAE Journal*, v. 53, Aug. '45, pp. 450-479.
Detailed technical knowledge of enemy weapons useful not only because of the tactical benefits involved, but also because of improvements in design that may be used to advantage. Raw materials supply situation of both Germany and Japan, and analysis of parts and processes involved in producing several of their weapons.

3-141. **Titanium in Chrome-Manganese Stainless Steel.** G. F. Comstock. *Iron Age*, v. 156, Aug. 9, '45, pp. 62-66.
Points out valuable rôle of titanium in austenitic 17% manganese, 12% chromium stainless steels; a rôle which heretofore had been only in part surmised.

3-142. **Fundamental Alloying Nature of Magnesium.** Louis A. Carapella. *Metal Progress*, v. 48, Aug. '45, pp. 297-307.
Reviews fundamental principles of alloying behaviors of magnesium to ascertain fully the nature and deportment of magnesium in combination with other metals and to acquire a working knowledge by which certain physical properties can be predicted for a given alloy combination, or by which new magnesium alloys can be fabricated with certain desirable physical properties. 20 ref.

3-143. **Metals for High Temperature Service.** *Industrial Heating*, v. 12, July '45, pp. 1209-1210, 1214, 1230.
Ferrous metals for applications involving resistance to high temperatures, and creep, recovery and relaxation of oxygen-free copper.

3-144. **Creep Resistant Alloy Steels.** *Iron Age*, v. 156, Aug. 2, '45, pp. 58-63.
Behavior of alloy steels at prolonged elevated temperatures shows that the addition of molybdenum to steel imparts high heat strength. Vanadium has a similar reaction in steel alloys but to a lesser degree. Comparative effect of other alloying agents like chromium, nickel, manganese and silicon on physical properties is also included. (From *Stal*, nos. 3 and 4, 1943, pp. 42-47.)

3-145. **Non-Rusting Steels.** A. M. Samarin. *Iron & Steel*, v. 18, July '45, pp. 226-229.
Effect of high nitrogen content on properties. 2 ref.

3-146. **The Modern Metallurgy of Some Wrought Copper Alloys.** R. H. Harrington. *General Electric Review*, v. 48, Aug. '45, pp. 41-49.
Wider knowledge of cold working and heat treatment gives promise of new engineering applications of commercial copper alloys.

3-147. **High Tensile Steel for Castings.** W. West, C. C. Hodgson and H. O. Waring. *Metallurgia*, v. 32, June '45, pp. 75-79.
Aspects of steel making and foundry practice, investigated in connection with the production of medium and high tensile steel castings. Types of steels were of the low and medium alloy varieties capable of giving ultimate tensile strengths from 35 to 65 tons per sq. in. on sections up to 4 in., or as high as 75 tons per sq. in. on smaller sections, accompanied by good ductility and resistance to impact.

3-148. **Effect of Overaging Aluminum.** *Light Metal Age*, v. 3, July '45, pp. 15, 31, 39, 41.
Illustrates the extent of the adverse effects of overaging high strength aluminum alloy sheet on physical properties and corrosion resistance.

3-149. **Technical Cohesive Strength.** *Metal Industry*, v. 67, Aug. 3, '45, p. 73.
Factors which determine cessation of plastic deformation. 1 ref.

3-150. **Effect of Heat Upon Residual Stresses.** La Motte Grover. *Iron Age*, v. 156, Aug. 16, '45, pp. 62-69.
Simple analyses to illustrate the actions of expansion, contraction, and elastic and plastic deformations resulting from the heating and cooling of mild steel; also the effects of these actions upon residual stresses and distortion. These actions and their effects are of significance in connection with such processes as welding, local stress relieving by any method involving heating, "flame straightening" to remove buckles or other distortion, preheating, postheating, local heating for bending or flanging, and other operations involving local heating, particularly if it is applied over a considerable length of material or if it is of a continuous, progressive nature.

4. STRUCTURE

Metallography and Constitution

4-50. **Grain Refinement of a Carbothermic Magnesium Alloy by Superheating.** Ralph Hultgren, David W. Mitchell and Bernard York. *Metals Technology*, v. 12, June '45, T. P. 1853, 8 pp.

Carbothermic ASTM no. 17 magnesium alloy experiences full grain refinement at temperatures as low as 1400° F. (760° C.). When held at 1300 or 1350° F. (704 or 732° C.) the unsuperheated alloy experiences incomplete grain refinement while the superheated alloy coarsens to some extent. Grain size obtained is virtually independent of superheat temperature provided sufficient time of superheating is allowed. 7 ref.

4-51. **Grain Refinement of Magnesium Alloys without Superheating.** Ralph Hultgren and David W. Mitchell. *Metals Technology*, v. 12, June '45, T. P. 1854, 5 pp.

Grain refinement of ASTM alloys nos. 17 and 4 may be obtained without superheating if they are stirred vigorously at 1400° F; electrolytic and carbothermic magnesium alloys both experience full grain refinement on stirring; most of the grain refinement occurs in the first minute of vigorous stirring in small 1-lb. crucibles. 6 ref.

4-52. **Factors Affecting Abnormal Grain Growth in Magnesium Alloy Castings.** A. T. Peters, R. S. Busk and H. E. Elliott. *Metals Technology*, v. 12, June '45, T. P. 1864, 23 pp.

Cast magnesium alloys of certain composition ranges and under certain casting conditions display the unusual property of undergoing local grain growth during heat treatment without the necessity of intentional mechanical stressing. Control methods have been developed for suppressing germination; among these, special heat treating cycles are particularly effective and are in industrial use, but chill coating and intelligent lacing of gates are also helful as additional control measures. Metallographic studies show that germination occurs during heat treatment by a general recrystallization of the as-cast structure, followed by the early coalescence of grains at a few spots throughout the casting and by growth of the germinant grains so formed. 14 ref.

4-53. **A Study of Factors Influencing Grain Size in Magnesium Alloys and a Carbon Inoculation Method for Grain Refinement.** C. H. Mahoney, A. L. Tarr and P. E. LeGrand. *Metals Technology*, v. 12, June '45, T. P. 1892, 20 pp.

Experiments to determine a procedure for grain size control of magnesium alloys, including the Elektron A5 and A8 type alloys. Grain size control can be obtained by carbon inoculation at considerably lower temperatures than is required for ordinary superheating practice. 11 ref.

4-54. **Metallographic Identification of Ferromagnetic Phases.** E. A. M. Harvey. *Metallurgia*, v. 32, June '45, pp. 71-72.

"Magnetic etchings" method for the metallographic identification of ferro-magnetic phases is perhaps not so widely known as it deserves to be. This brief description of the method and apparatus used is given so that those workers not familiar with the detailed procedure may have available working details of the simple apparatus required.

4-55. **A New Method of Evaluating Grain Size.** William A. Johnson. *Steel*, v. 117, Aug. 20, '45, pp. 128-131, 168, 170, 172, 174.

Logarithmic relationship between dimensions of grain and grain size number aids calculation in new system for determining spatial grain size of equiaxed polycrystalline metals. Distribution of sizes shown to be all-important. 2 ref.

5. POWDER METALLURGY

5-31. **Hard Cutting Tools and Their Sharpening.** *Le Genie Civil*, no. 3104, v. 120, no. 5, March 1, '43, *Engineer's Digest* (American Edition), v. 2, June '45, pp. 270-273.

Chromium, carbon, molybdenum, nickel, vanadium, boron, and even particles of diamond, enter into the making of the cutting tips now used. Choice and proportions of these numerous constituents vary according to the qualities of endurance, hardness, resistance or toughness of cut required. Preparation involves successive transformations beginning with the carbide powders and fusible metals.

5-32. **Sintered Beryllium for X-ray Tube Windows.** Floyd C. Kelley. *Iron Age*, v. 156, July 26, '45, pp. 68-69.

Process of pressing and sintering coarse beryllium powder without the use of any grain refining elements, such as titanium, for producing an X-ray window which is less susceptible to cracking due to thermal stresses encountered in brazing.

5-33. **Magnetic Powders.** H. Gregory Shea. *Electronic Industries*, v. 4, Aug. '45, pp. 86-89, 186, 190, 194, 198, 202.

Many physical and chemical characteristics bear on the usefulness of metallic and compound iron powders.

5-34. **Postwar Horizons for Powder Metals.** P. Schwarzkopf and A. Reis. *American Machinist*, v. 89, Aug. 2, '45, pp. 99-103.

Present possibilities and limitations of the art. Small machine parts, especially those difficult to machine or requiring peculiar properties, are being manufactured at costs which compare favorably with better known methods.

5-35. **Miracle or Mirage.** Fred P. Peters. *Scientific American*, v. 173, Aug. '45, pp. 99-101.

Powder metallurgy, an older art than many realize, can thank the automotive industries for much of its recent expansion. Will this growth continue or will the modern miracle prove to be a mirage?

5-36. **Machine Parts and Bearings Fabricated From Powdered Metals.** George E. Platzer. *Tool Engineer*, v. 14, July '45, pp. 36-39.

Less machining, closer limits, release of critical machine tools and lower production costs are among advantages of modern powder metallurgy.

5-37. **Metal Powders.** *Metal Industry*, v. 67, July 27, '45, pp. 53, 55.

Metal powders are usually made by electro-deposition (copper), by reduction of oxides (tungsten, molybdenum, and sometimes nickel, iron and cobalt), by atomizing (lead and tin), or by decomposition of the carbonyls (iron and nickel). 3 ref.

5-38. **"Diecarb" Blanking and Forming Dies.** *Tool & Die Journal*, v. 11, Aug. '45, pp. 112-114.

Sintered carbide blanking and forming dies make use of inserts of Diecarb, sintered carbide combinations with Rockwell hardnesses of from 65 to 73. Life, versatility and application of Diecarb.

5-39. **Processing Techniques Affect Design of Powder Metal Parts.** P. Schwarzkopf. *American Machinist*, v. 89, Aug. 16, '45, pp. 118-121.

Clever tool design accomplishes much toward realizing intricate shapes, but for every part one must remember the peculiarities of compacting and sintering.

6. CORROSION

6-90. **Corrosion Primer.** *Corrosion & Material Protection*, v. 2, June '45, pp. 21-22.

Hydrogen ion concentration.

6-91. **Further Observations on the Protective Influence of Manganese in the Corrosion of Aluminum-Containing Magnesium Alloys.** F. A. Fox. Institute of Metals *Journal*, v. 12, May '45, pp. 255-265.

Magnesium alloys of the chemical composition required by D.T.D. specification 59A have been examined for corrosion resistance. Material in the solution-treated condition corrodes faster than that in other states when tested by complete immersion, irrespective of the iron content; under conditions of atmospheric exposure, however, the material in all three structural states shows similar corrosion resistance. Possible reasons for this difference in behavior under the two conditions of test are discussed. 4 ref.

6-92. **Corrosion Resistance of Clad 24S Aluminum Alloys.** C. M. Marshall. *Automotive Industries*, v. 93, July 1, '45, pp. 28-29.

Results of tests during which clad 24S, both aged and unaged, was exposed to a salt spray solution for 500 hr. and to an accelerated corrosion media containing salt and H_2O_2 for a 48-hr. period indicate that the yield and ultimate strengths of both types were not affected by either of the corrosive solutions. Elongation of both materials was reduced approximately 2% by the above exposure but remained above applicable specifications.

6-93. **Comparative Corrosion Resistance of Steels in Marine Atmospheres and in Sea Water.** *Steel*, v. 117, July 23, '45, pp. 122, 157.

Experiments indicate that corrosion rate of an unprotected steel is dependent on compositions. Low alloy, high strength steels, with superior corrosion resistance in industrial atmospheres, also are more resistant in marine atmospheres, but to varying extents. To obtain untarnishable steel, a very high alloy content is necessary, with its attendant higher costs. Zinc-coated products are highly satisfactory under many conditions and worthy of consideration in any proposed service.

6-94. **Old Man Corrosion at the Refinery.** William F. Kramer. *Pure Oil News*, v. 28, Aug. '45, pp. 12-16.

A destructive and continuous inhabitant working under cover to increase hazard and cost. Methods used to stop it.

6-95. **Tests on Iridite Finish for Cadmium and Zinc Plated Steel.** Kenneth E. Dorcas and N. H. Simpson. *Iron Age*, v. 156, July 26, '45, pp. 61, 143.

Independently made tests indicate that the iridite treatment applied to either cadmium or zinc plate results in greater corrosion resistance than untreated plate, this chemical finish being more essential for zinc than for cadmium plate.

6-96. **Marine Tests Rate Alloy Performance.** J. Albin. *Iron Age*, v. 156, July 26, '45, pp. 62-67, 82.

Research on corrosion of metals at Kure Beach, N. C., over a period of ten years should stimulate alloy development and design of apparatus to suit corrosion characteristics of metal. Many data have been amassed to predict by color and texture in the early stages the total performance of rust in steels. Extensive tests are in process on the corrosion resistance properties of magnesium alloys in aircraft applications.

6-97. **Erosion Tests of Cast Alloys in Sea Water.** L. R. Voigt. *Inco*, v. 19, no. 4, 1945, pp. 9-11.

Used to confirm practical experience with pump impellers and provide additional technical data.

6-98. **Light Alloys Under Marine Conditions.** *Light Metals*, v. 8, July, '45, pp. 308-318.

Results of exposure tests on a range of small castings in light and ultra-light alloys, subjected to different protective treatments, during a prolonged voyage with wide variations of climate and corrosion hazard.

6-99. **Corrosion in Magnesium Alloys.** James L. Erickson. *Light Metal Age*, v. 3, July '45, pp. 12-14, 40.

Reviews the nature and mechanism of the corrosion of magnesium and magnesium alloys with special reference to how the corrosion resistance of this light metal affects its industrial applications and what steps are being taken by the magnesium producers to furnish the magnesium buyer with magnesium alloys of improved corrosion resistance. 4 ref.

6-100. **Petroleum Base Rust Preventive.** G. A. Durham. *Western Machinery & Steel World*, v. 36, July '45, pp. 314-317, 335.

Petroleum-type materials offer advantages of ease of application, economy, ease of removal; dimensions and surfaces of finely finished parts are not affected; oil-type products may also function as lubricants; certain other advantages are apparent in specific applications.

6-101. **Avoiding "Smut" from Aluminum Etchants.** Fred Tauber. *Iron Age*, v. 156, Aug. 2, '45, p. 57.

Fluoride preparations used as etchants for aluminum sheets prior to spot welding in many cases leave a black film on the surface of the etched metal. Recently it has been demonstrated that this smut may be "decoyed" from depositing on the product by taking advantage of a well known principle of electrochemistry involving the electromotive series of metals.

6-102. **Corrosion in the Tropics.** George W. Grupp. *Metal Finishing*, v. 43, Aug. '45, pp. 326-328.

Metal finishes and organic protective coatings, which are thought to be reasonably durable are quickly laid low by the agencies of corrosion under the tropical conditions of the Central and South Pacific. Causes of trouble and some of the solutions found.

6-103. **Low Carbon Steel.** A. Wachter and N. Stillman. *Iron & Steel*, v. 18, July '45, pp. 239-240.

Corrosion by phenol at high temperatures.

6-104. **Use of Soluble Inhibitors.** U. R. Evans. *Industrial & Engineering Chemistry* (Industrial edition), v. 37, Aug. '45, pp. 703-705.

Factors deciding between corrosion and inhibition. When the immediate corrosion product is sparingly soluble, attack is likely to be stifled. Anodic inhibitors function by forming a sparingly soluble anodic product. Cathodic inhibitors form sparingly soluble products on the cathode areas. 13 ref.

6-105. **Zinc, Manganese, and Chromic Salts as Corrosion Inhibitors.** R. S. Thornhill. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 706-708.

Data presented showing that the rate of corrosion of steel in tap water is reduced by adding small quantities of zinc and manganese salts; chromic salts bring about a certain measure of inhibition at low, but not high concentrations. At relatively high concentrations of zinc and chromium, marked intensification occurs in the water-line zone; manganese salts are free from this defect, since the water-line zone is not attacked.

6-106. **Threshold Treatment of Water Systems.** G. B. Hatch and Owen Rice. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 710-715.

Corrosion and the deposition of calcium carbonate and iron oxide in water systems may be controlled by treatment with very low concentrations of the molecularly dehydrated phosphates. 38 ref.

6-107. **Protection of Small Water Systems from Corrosion.** William Stericker. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 716-720.

The life of piping and plumbing fixtures can be greatly increased by the addition of small amounts of sodium silicates to the water passing through them. Hot water can be treated by passing a small part of it over Na_2O: 3.3 SiO_2 glass. Field tests show improved conditions with steel after 17 years of treatment. Yellow brass is also protected. 17 ref.

6-108. **Galvanic Corrosion of Steel Coupled to Nickel.** H. R. Copson. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 721-723.

Galvanic corrosion tests on steel coupled to nickel in tap water. With a 3 to 1 area ratio of nickel to steel, galvanic corrosion of the steel was appreciable but not excessive. Treating the water with 300 parts per million of sodium chromate practically inhibited corrosion, provided the steel was rubbed occasionally. Undisturbed steel was liable to pitting. Treating the water with lime to pH 11 cut down the total corrosion but localized it, with the result that the maximum rate of penetration was increased. 4 ref.

6-109. **Inhibitors of Corrosion of Aluminum.** G. G. Eldredge and R. B. Mears. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 736-741.

Inhibitors for aluminum behave differently in various acids. Chromates are effective in phosphoric acid but not in hydrochloric. Nitrogen compounds and pickling inhibitors that are effective for steel are usually more effective for aluminum in hydrochloric than in phosphoric acid. No very effective inhibitors for aluminum in sulphuric acid are known. In waters, chromates, silicates, and soluble oils were most effective. Against galvanic corrosion by contact with copper, the same materials functioned to some extent, especially when the sodium chloride content was as low as 10 p.p.m. 52 ref.

6-110. **Chromate Corrosion Inhibitors in Bimetallic Systems.** Marc Darrin. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 741-749.

When dissimilar metals are in contact in an aqueous medium, the corrosion of one of the metals is accelerated. Report describes the technology, rather than the theory, of inhibiting this kind of corrosion by means of chromate, under conditions encountered in practice. The effect of time of exposure, temperature, aeration, submergence of panels, initial pH, and chromate concentration are shown as they influence the corrosion of various bimetallic systems. 26 ref.

6-111. **Sodium Nitrite as Corrosion Inhibitor for Water.** A. Wachter. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 749-751.

Sodium nitrite is a good corrosion inhibitor for water and under many conditions can completely suppress the corrosion of steel. Concentrations of nitrite needed for pronounced inhibition vary with the severity of conditions and the pH and composition of the water. 4 ref.

6-112. **Corrosion Control With Threshold Treatment.** G. B. Hatch and Owen Rice. *Industrial & Engineering Chemistry* (Industrial Edition), v. 37, Aug. '45, pp. 752-759.

Factors in formation of protective films upon steel by waters treated with glassy phosphates. 10 ref.

6-113. **Future Metals.** Irwin H. Such. *Steel*, v. 117, Aug. 13, '45, pp. 110-113, 158, 160.

Proving ground for measuring the corrosion resistance of iron and steel and the non-ferrous metals at Kure Beach. Devoted to the effects of sea air and salt water, the studies constitute an excellent measure of the relative corrosion resistance of metals and alloys and finishes for metals, because of the unusually severe conditions encountered.

7. CLEANING AND FINISHING

7-163. **Considerations in the Use of Paint For Metals Protection.** J. H. Finley. *Corrosion & Material Protection*, v. 2, June '45, p. 18.

Metal to be protected must be properly cleaned and prepared. Selection of finish coat is dependent entirely upon the conditions existing.

7-164. **Metallizing—Modern Production Tool.** William M. Flashenberg. *Tool Engineer*, v. 14, June '45, pp. 46-47.

Many metals can be "spray-coated" to provide hard surface or to reclaim worn or undersize parts.

7-165. **Metallizing—a Production Process.** L. E. Kunkler. *Metals & Alloys*, v. 21, June '45, pp. 1648-1649.

Few engineers realize the extent to which sprayed-on metals are employed as elements in original design and production, as distinct from repair and maintenance uses and the promising field for metallizing as a production design tool. Describes typical successful applications, features the materials engineering aspects and the special service characteristics frequently provided by metallized parts.

Metal Literature Review—*Continued*

7. CLEANING & FINISHING *(Cont.)*

7-166. **Chemical Treatment of Aluminum Improves Paint Adherence.** C. B. Gleason. *American Machinist,* v. 89, July 19, '45, pp. 113-114.
Providing a bond for painted finishes is the one principal function of chemical treatment of aluminum. Corrosion resistance increase is considered a minor secondary effect.

7-167. **Chemical Surface Treatment for Gear Teeth.** *Automotive Industries,* v. 93, July 1, '45, pp. 40, 102, 104, 106, 108, 110, 112.
Series of tests to determine the effectiveness of various chemical surface treatments as means to prevent or delay failure of gears by scuffing; results are considered sufficiently promising to warrant experimental application of one class of the chemical treatments investigated (phosphating) in cases where scuffing is likely to occur. Treatments applied to the gears were essentially the same as those applied in this country to piston rings and certain other parts to prevent scoring; abstract of a report on the test.

7-168. **Works Practice in the Pickling of Steel.** E. Marks. *Sheet Metal Industries,* v. 22, July '45, pp. 1179-1183.
Inhibitors; rusting after pickling; mixed acids.

7-169. **The Finishing of Light Alloys. Part VII.** H. Silman. *Sheet Metal Industries,* v. 22, July '45, pp. 1211-1218.
Aluminum; etched finishes; anodizing; chromic acid process; operating conditions; plant limitations of the process; sulphuric acid processes operation; maintenance of bath; properties of anodic films; impurities in the bath; dyeing of anodic films; dyes; multi-color effects; photographic processes; pigment impregnation; sealing of anodic films. 14 ref.

7-170. **Electrolytic Methods of Polishing Metals, Part VIII—The Precious Metals.** S. Wernick. *Sheet Metal Industries,* v. 22, July '45, pp. 1221-1222, 1229-1233.
Platinum and palladium; platinum plating; palladium plating. 11 ref.

7-171. **Trick Finishes.** S. P. Wilson. *Industrial Finishing,* v. 21, July '45, pp. 26-28, 30.
Novel and decorative finishes that can be utilized to give strikingly attractive effects to a number of postwar civilian products.

7-172. **Cleaning of Metals for Production Painting.** Ray Sanders. *Industrial Finishing,* v. 21, July '45, pp. 32, 34, 36, 38.
When the surface is coated with foreign matter adhesion of paint cannot take place. It is necessary therefore to remove grease, oil and dirt in order that a smooth, tightly adherent paint job can be obtained.

7-173. **Quality Control Through Production Records.** William W. Loman. *Industrial Finishing,* v. 21, July '45, pp. 44, 46, 48.
System to provide an accurate record of the quantity and kind of parts that are put through on each order, the strength and temperature of metal cleaning solutions used, all facts about paint materials applied; oven baking time and temperatures and the names of workers who were in charge of operations.

7-174. **Conveyorized Finishing.** E. H. Trettin. *Industrial Finishing,* v. 21, July '45, pp. 50-52, 54, 56.
Several recommendations and suggestions to manufacturers who plan to investigate or install conveyorized finishing.

7-175. **Cleaning, Painting, Drying Setup for Steel Cabinets.** Ralph F. Lane. *Industrial Finishing,* v. 21, July '45, pp. 60-64, 68-69, 72.
How a conveyorized setup for surface cleaning, painting, and drying steel cabinets was planned, engineered and put in, what operating schedules were developed, the number of employees needed, speed of conveyor, and a peek at the estimated finishing costs.

7-176. **Coating Armored Electric Cables for Ships.** Henry Novak. *Industrial Finishing,* v. 21, July '45, pp. 98, 100, 102.
Hundreds of thousands of feet of cable primed with the simple dipping equipment described. Same idea could be adapted for various other jobs of coating or treating cable, wire, or rope.

7-177. **Jungle Tests for Metal Finishes.** Burr Price. *Products Finishing,* v. 9, July '45, pp. 32-34, 36, 38.
Destructive effect of mildew and fungus attack on troop equipment. Chemical treatments have been perfected for use on the clothing of the boys to make them resistant to the attacks of disease-carrying mites. Development of materials which will serve as moisture barriers.

7-178. **Aluminum Coating for Unplated Can Stock.** W. B. Roberts. *Modern Packaging,* v. 18, July '45, pp. 122-125.
To improve the corrosion resistance of the blackplate and bonderized stock, can manufacturers have turned to a proved method of protection involving the use of aluminum pigmented coatings. Aluminum enamels used for coatings of this type consist of a mixture of extremely fine aluminum pigment and a varnish liquid similar in most respects to that employed with other colors.

7-179. **The Successful Finishing of Electrically Insulated Wire and Cable. III.** Ralph C. Ellams. *Wire & Wire Products,* v. 20, Aug. '45, pp. 569-572.
Production problems and their solution. Incompatability in reservoir or on wire; poor coating pick-up; excessive coating pick-up; irregular coating; sleeving; sticking on sheaves; sticking on adjacent strands; flattening of finish on sheaves; blistering; pinholing; coating deformation on reeling.

7-180. **Cleaning Aluminum.** C. W. Smith. *Modern Metals,* v. 1, Aug. '45, pp. 16-17.
Surface contaminates and oxides must be removed from aluminum products before spot welding or paint-bond treatments; describes the steps necessary in the cleaning process.

7-181. **Papers on Surface Finish.** *Engineers' Digest* (American Edition), v. 2, July '45, pp. 341-344.
Structure of sliding surfaces; short review of surface finish in relation to friction and lubrication; some principles and methods of surface measurement; results of modern practice.

7-182. **Metallizing Magnesium.** Roy Fellom. *Light Metal Age,* v. 3, July '45, pp. 11, 33.
Relatively new processing application for magnesium described and possible applications which may not prove out under testing.

7-183. **Surface Comparison.** *Western Machinery & Steel World,* v. 36, July '45, p. 311.
New process reproduces faithfully specified machine finishes. It is a refinement on electro-forming methods which permit plating with hard metals, and will reproduce exact facsimiles of surfaces down to the millionth of an inch.

7-184. **Chromizing Processes.** D. W. Rudorff. *Metallurgia,* v. 32, June '45, pp. 59-62.
Process of diffusing chromium into the metallic surface depends for its success on the effective and uniform supply of chromium to the surface to be treated and also upon the maintenance of conditions favorable for diffusion in sufficient depth. The use of granular chromium or ferrochrome and of liquid chromium are briefly referred to but particular attention is directed to the use of the gaseous phase by the employment of chromous chloride.

7-185. **Wearing Qualities of Gold Deposits.** George E. Hogaboom. *Metal Finishing,* v. 43, Aug. '45, pp. 329-330.
Good lacquer superior to heavier gold deposits.

7-186. **Analysis of Hydrofluoric-Nitric Acid Stainless Steel Pickling Bath.** William E. McKee and William F. Hamilton. *Metal Finishing,* v. 43, Aug. '45, pp. 332-333, 339.
Economical and efficient operation of the hydrofluoric-nitric acid stainless steel pickling bath requires control by chemical analysis. In this paper rapid quantitative analytical procedures are presented for the analysis of the bath. 9 ref.

7-187. **Sandblasting Removes Sharp Angles From Aluminum Alloy Spar Caps.** J. B. Adams. *American Machinist,* v. 89, Aug. 16, '45, pp. 111-112.
Seven adjustable nozzles direct sand to all of the surface parts of extrusions. Special handling equipment avoids marring of cap.

8. ELECTROPLATING

8-98. **Anodes.** S. R. Goodwin and H. A. Bechtold. *Metal Industry,* v. 67, July 6, '45, pp. 10-12.
Manufacture of various types of anodes and their advantages and disadvantages. (From Electrodepositors' Technical Society).

8-99. **American Electroplaters' Society Project Number One on Stripping of Copper from Various Base Metals. Progress Report Number Two.** F. C. Mathers, C. E. Landwerlen, and E. L. Martin. *Monthly Review,* v. 32, July '45, pp. 672-679, 719.
Abstract of literature; chemical methods; electrochemical methods. 35 ref.

8-100. **Anodes.** S. R. Goodwin and H. A. Bechtold. *Metal Industry,* v. 67, July 20, '45, pp. 42-44.
Influence of anode characteristics in plating processes.

8-101. **Taming Hard-Shell Kirksite.** John W. Davis. *Wings,* v. 4, Aug. '45, p. 1673.
Chromium plating of soft-metal die surfaces lengthens their life in forming tough stainless-steel sheet for Superfortress parts. A special chemical stripping process now makes it possible to remove the plating locally for repairs without destroying the base metal.

8-102. **Estimation of Wetting Agent Concentration.** A. B. Ashton and N. J. Stead. *Metallurgia,* v. 32, June '45, pp. 53-56.
Surface active materials, or wetting agents, have in recent years found increasing application in electroplating and allied processes. A reliable routine test is necessary and a method of estimating the amount of wetting agent present in the solution is described which is both rapid and simple.

8-103. **Peacetime Plating.** R. MacNair. *Metal Industry,* v. 67, Aug. 3, '45, pp. 74-76.
Refresher for those operators who have been engaged on dull finishes during the war. Draws attention to the bright finishes of peacetime. Plant and equipment for bright nickel and chromium.

8-104. **The Future of Electroplating.** C. B. F. Young. *Metal Finishing,* v. 43, Aug. '45, pp. 334-335.
Is there a future in it? Can it stand on its own?

8-105. **Plating of Plastics at Monroe Auto Equipment Company.** Bryant W. Pocock. *Products Finishing,* v. 9, Aug. '45, pp. 48-50, 52, 54, 56, 58, 62, 64.
Good plastic for plating must be smooth. Minute defects are magnified after plating and burnishing. Second qualification is hardness. Process described consists of reduction of silver in the presence of tin and hydrochloric acid. When sprayed, the two metallizing solutions enter and leave the spray gun separately in such a manner that the two streams converge to meet and blend at the proper distance in front of the gun for convenient handling. 6 ref.

8-106. **Electroforming Suggested Technique.** Samuel Wein. *Products Finishing,* v. 9, Aug. '45, pp. 66, 68.
Methods commonly employed in electroforming.

9. PHYSICAL AND MECHANICAL TESTING

9-91. **Tensile Deformation.** John H. Hollomon. *Metals Technology,* v. 12, June '45, T. P. 1879, 22 pp.
Effects of tensile strain and changes of metallurgical structure on the stress required for plastic flow are discussed. Over a wide range of strains, the stress required for plastic flow is found to vary with the strain to a small fractional power. For steels, this power relation extends from strains at least as small as 0.01 to strains of 0.4. 36 ref.

9-92. **Torsional Fatigue Testing Apparatus for Large Components.** E. Lehr and A. Skiba. *MTZ,* v. 5, nos. 6 and 7, July '43, pp. 175-182. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 267-270.
To assess the actual service reliability, two factors must be ascertained: Magnitude, and variation with time (periodicity) of the forces, and moments to which the part is subjected during operation; and the fatigue strength of the part, that is, the range of the fluctuating forces and moments which the part is able to withstand through any number of cycles when applying, in the testing machine, stresses similar to those occurring in service.

9-93. **Hardness and Wear Resistance.** Martin Littmann. *Engineering*, v. 159, June 29, '45, pp. 502-503.

Attempt to determine to which other properties the wear resistance of individual metals corresponds; in all cases in which the wear resistance of a material is important, it would be advisable to rely upon the scratch hardness rather than on indentation or Scleroscope methods.

9-94. **Relative Mechanical Corrosion Hardness of Synthetic Corundum.** W. F. Eppler. *Industrial Diamond Review*, v. 5, June '45, pp. 121-125.

Investigation to determine numerical or quantitative hardness differences and effect of tempering. Evaluation of relative mechanical corrosion hardness by simply comparing the values.

9-95. **The Relation of Stress to Strain in Magnesium Base Alloys.** *Journal of the Aeronautical Sciences*, v. 12, July '45, pp. 273-280.

Stress-strain curves to the yield strength are given for most of the commercially available forms of magnesium base alloys. For the high-strength wrought alloys, typical curves based on tests of large numbers of different lots are presented. The curves for the other materials are the averages of a few tests on one lot. The values obtained for the modulus of elasticity were found to be a sensitive function of the testing technique. With careful testing the values were distributed quite closely around a mean of about 6,500,000 psi. This ratio of compressive yield strength to tensile yield strength is close to unity for the high strength wrought alloys and for the casting alloys. It is substantially less than unity for the lower strength wrought alloys. 11 ref.

9-96. **Correction of Aluminum Alloy Compressive Test Results for Material Properties Using Reduced Moduli.** Jacob Karol. *Journal of the Aeronautical Sciences*, v. 12, July '45, pp. 305-310, 328.

Presents a method of correcting compression test results of aluminum alloys for variations of test material properties from standard; method uses column curves based on reduced moduli. Correction curves are given for 24S-T Alclad sheet and 75S-T Alclad sheet. 10 ref.

9-97. **Curved Aluminum-Alloy Sheet in Compression for Monocoque Constructions.** Georges Welter. *Journal of the Aeronautical Sciences*, v. 12, July '45, pp. 357-369.

Throws some light on the mechanical behavior of thin light alloy sheets under compression and gives an explanation about minimum load that thin-walled structures can support under axial thrust. 7 ref.

9-98. **The Impact Strength of Some Metallic Arc Weld Metal Deposits at Elevated Temperature.** John F. Eckel and R. J. Raudebaugh. *Welding Journal*, v. 24, July '45, pp. 372s-377s.

Purpose is to determine the temperature range at which a loss of ductility occurs in weld-deposited metal and to determine the cause of such loss of ductility. This knowledge should be of value in predicting auto-cracking tendencies.

9-99. **Fatigue Strength of Fillet, Plug and Slot Welds in Ordinary Bridge Steel.** *Welding Journal*, v. 24, July '45, pp. 379s-400s.

Fatigue testing, under axial loading, of several sets of steel specimens so designed that the tensile (or compressive) loads should be transmitted from one part to another through the shearing of fillet, plug or slot welds. The joints were in general such as might be conceived for connecting one end of a flat plate or channel tension member in a bridge or building, to a gusset plate or a chord member.

9-100. **The Development of a Single-Blow Impact Test for Cast Iron.** Iron & Steel Institute, Advance Copy, June '45, 21 pp.

Simple test to evaluate measure of shock resistance. Recommended procedure evolved, now in regular use by a number of investigators prior to ultimate standardization. Peculiarities of the test on cast iron exist, such as the double-blow effect, whereby the broken part of the specimen shows frequently two or more impressions of the knife-edge. This phenomenon has been studied in detail and the mechanism of the double-blow effect finally established by a high speed photographic record of the test in progress. Other variables have also been studied with a view to their elimination as possible disturbing factors in the test.

9-101. **Notch Impact Tests.** C. F. Keel. *Welding*, v. 13, July '45, pp. 242-247, 252.

Survey of notch impact testing as applied to gas welds. Work carried out in both Switzerland and Germany in this field. (Report published in the Swiss *Zeitschrift fuer Schweisstechnik*, Nov., 1944.) 9 ref.

9-102. **The Theory of Indentation and Hardness Tests.** R. F. Bishop, R. Hill and N. F. Mott. *Proceedings of the Physical Society*, v. 57, May 1, '45, pp. 147-159.

Discussion of the indentation of ductile materials by cylindrical punches with conical heads. Experiments made with work-hardened and with annealed copper, with penetrations up to nine times the diameter of the punch. It is found that the load rises towards a maximum value which is not approached until the base of the cone has traveled four to five diameters into the copper block. 5 ref.

9-103. **The Determination of the Hardness of Martensite and Austenite by Means of the Microhardness Tester.** H. Hanemann. *Metallurgia*, v. 32, June '45, pp. 62-65.

Determines the hardness of martensite, austenite and their transition phases in a 1.7% carbon steel. Results of the investigation are given, together with a description of a new microhardness tester used for experiments. (From *Archiv. fur Eisenhüttenwesen*, v. 15, 1942, pp. 403-406.)

9-104. **The Yielding Phenomenon of Metals. VI.** Georges Welter. *Metallurgia*, v. 32, June '45, pp. 80-84.

Influence of speed and loading conditions.

9-105. **Research on Fatigue Strength of Screw Threads of Different Form.** D. G. Sopwith and T. Settle. *Engineering*, v. 160, July 20, '45, pp. 58-59.

Method of testing; materials; method of thread production; program of tests.

9-106. **Martempering Steel Limitations of Hardness Penetration.** B. F. Shepherd. *Product Engineering*, v. 16, Aug. '45, pp. 515-517.

Data on hardness penetration and analysis of the use of the Jominy test.

10. ANALYSIS

10-63. **Photometric Analysis.** D. F. Phillips and L. L. Edwards. *Metal Industry*, v. 66, June 29, '45, pp. 409-410.

Methods described which utilize the photometric measurement of solutions containing the brown complex of copper with sodium diethyldithiocarbamate and the red nickel-dimethylglyoxime complex. Ranges of 0.2 to 5% for copper and 0.2 to 3% for nickel are covered by a single calibration of the Spekker Absorptiometer for each element. 2 ref.

10-64. **Spectrophotometer—Analytical Tool Extraordinary.** Bryant W. Pocock. *Products Finishing*, v. 9, July '45, pp. 66-68, 70, 72, 74, 76.

Detailed instructions for the determination of chromium.

10-65. **Non-Destructive Spectrographic Sampling.** S. L. Widrig and F. W. Lutz. *Metal Progress*, v. 48, Aug. '45, pp. 276-279.

Major problem is to obtain satisfactory samples. Desirable qualities of sample are that it be in a form that provides satisfactory analytical accuracy, that excessive time is not consumed in its preparation, that the number of parts scrapped in obtaining samples is held to a minimum, and that they be handled conveniently in the laboratory.

10-66. **Recent Developments in Analytical Chemistry, XIV.** *Chemical Age*, v. 52, June 30, '45, pp. 560-564.

Neglect of analytical chemistry; two valuable reviews; detection of bismuth; estimation of bismuth; detection of zinc; determination of zinc; volumetric methods; miscellaneous methods. 30 ref.

10-67. **Problems Concerning the Microchemical Balance, Part II-Cleaning.** David W. Wilson. *Metallurgia*, v. 32, June '45, pp. 85-88.

Microchemical balance is one of the most sensitive and delicate ,and at the same time one of the most fundamental instruments employed in analysis. Fairly frequent cleaning is necessary, but it can easily be rendered useless, and indeed detrimental, by damage inadvertently caused during the process. The equipment and precautions necessary for the cleaning are described.

10-68. **The Routine Analysis of Aluminum Alloys by Colorimetric Methods.** D. F. Phillips. *Industrial Chemist*, v. 21, July '45, pp. 365-371.

Electrolytic methods; development of colorimetric technique; Spekker absorptiometer; advantages of colorimetric methods; colorimetric determination of copper and nickel; zinc by the polarograph. 2 ref.

10-69. **Determination of Nitrogen in Steel and Steel Welds.** R. H. Powell. *Welding*, v. 13, July '45, pp. 249-252.

Presence of combined nitrogen may confer upon steel properties which are either desirable or undesirable according to the use to which the steel is to be put. By the introduction of nitrogen into weld metal, that same hardness may produce brittleness, age hardening, low Izod values, and in general undesirable properties into the weld. Application of the Kjeldahl method of determination to steels led to design an apparatus whereby the nitrogen content of steel might be determined both rapidly and with reproducible accuracy.

11. LABORATORY APPARATUS, INSTRUMENTS

11-54. **Practical Electric Resistance Strain Gage Procedures for Structural Tests on Ships.** W. V. Bassett. American Society for Testing Materials *Bulletin*, no. 134, May '45, pp. 9-16.

Adoption of the electric resistance strain gage for studies of welding stresses in structures has required development of techniques for obtaining consistent results under outdoor and workshop conditions. Gage stability is necessary over longer periods than in other applications. Strain gage procedures described in this paper have given results accurate within ± 500 psi. Two fundamental test methods are: To observe changes in strains due to operations producing stress in the structure, and to measure relaxation of plugs trepanned or cut out from the structure after the operations are complete. Resistance strain gages applied to studies of welding stresses on subassemblies. 9 ref.

A.S.M. Review of Current Metal Literature — *Continued*

11. LABORATORY APPARATUS, INSTRUMENTS (cont.)

11-55. **Testing The Thickness of Non-Ferrous Castings.** B. M. Thornton. *Engineering,* v. 159, Feb. 2, '45, pp. 81-83. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 293-295.
Principle employed in determining the wall thickness of intricate castings by electrical method is shown. Current from a direct-current source is passed through the metal wall by two contacts. The potential drop caused by the flow of current, which is indicated on a galvanometer and can be used as a measure of the wall thickness, is picked up by two closely adjacent contacts.

11-56. **A New Evaluation of Surface Finishes.** William F. Klemm. *Tool Engineer,* v. 14, June '45, pp. 42-44.
Width, not depth, of interruptions determines the wear resistance of surfaces. Standards used; means of comparing such finishes for control of surface quality.

11-57. **Metal-Working Discovers Electronics.** *American Machinist,* v. 89, July 19, '45, pp. 118-120.
Already widely used, electronic devices are regarded by industry as a potential solution to many plant problems. Survey reveals some interesting factual material on electronics.

11-58. **Surface Roughness.** L. P. Tarasov. *Industrial Diamond Review,* v. 5, July '45, p. 162.
Relationship of readings to actual surface profile.

11-59. **Metallographic Technique, II.** *Metal Industry,* v. 67, July 6, '45, pp. 9, 12.
Modern methods for producing an "ideal" specimen. 6 ref.

11-60. **Note on Fusing of Instruments.** B. F. McNamee. *Instruments,* v. 18, July '45, p. 455.
What is the effect on calibration?

11-61. **Surface Measurement.** *Aircraft Production,* v. 7, July '45, pp. 307-308.
Optical meter for fine reflective surfaces.

11-62. **Interpreting and Recording Data From SR-4 Gages.** Given Brewer. *Metal Progress,* v. 48, Aug. '45, pp. 270-273.
Describes some simple assemblages of electrical equipment necessary to measure and record the indications given by electric strain gages, the construction and theory of which was described in a preceding article. Type of such equipment varies within wide limits depending on speed of measurement, distance between object and instrument, on whether object is stationary or moving, and on whether individual measurements or autographic records are wanted.

11-63. **Supersonics in Metal Finishing.** *Monthly Review,* v. 32, July '45, pp. 688-690.
Production of supersonics; applications of supersonics.

11-64. **Measuring Thickness.** *Electronic Industries,* v. 4, Aug. '45, p. 101.
Gamma rays from radium source are used to measure wall sizes by detecting the reflections from molecules.

11-65. **Electronic Measurement, Analysis, and Inspection—Part II.** Holbrook L. Horton. *Machinery,* v. 51, Aug. '45, pp. 168-173.
Fundamentals of electronics and the ways in which electronic devices can be applied in the mechanical field.

11-66. **Interpreting Surface Roughness Readings.** L. P. Tarasov. *Mahine Design,* v. 17, Aug. '45, pp. 137-138.
Shows how roughness measurements can be converted to linear microinches that can be visualized readily and handled in the same manner as any other linear dimension.

12. INSPECTION AND STANDARDIZATION

12-148. **General Properties of Industrial Radiographic Films.** Herman E. Seemann. American Society for Testing Materials *Bulletin,* no. 134, May '45, pp. 17-27.
Film characteristics; interpretation of the characteristic curve; factors influencing the shape of the characteristic curve; fog; graininess; processing.

12-149. **Rationalization of Aluminum Alloy Specifications.** A. E. Russell. Royal Aeronautical Society *Journal,* v. 49, no. 409, Jan. '45, pp. 14-20. *Engineer's Digest* (American Edition), v. 2, June '45, pp. 295-298.
Survey of the progress made puts the facts in their proper perspective.

12-150. **Simplified Inspection of Thread Gages.** F. W. Boeckel. *Tool Engineer,* v. 14, June '45, p. 29.
A simple fixture, in combination with 3-wire method, provides easy checking of pitch diameters of pipe thread gages.

12-151. **Castings Inspection and Qualifications of Inspectors.** A. K. Higgins. *American Foundryman,* v. 7, July '45, pp. 38-39.
Qualities most desirable in a foundry inspector listed.

12-152. **Steel Castings Radiography.** E. L. LaGrelius. *American Foundryman,* v. 7, July '45, pp. 46-56.
Discusses the application of general principles of radiography in the foundry.

12-153. **Statistical Control—the Yardstick of Performance.** Roger W. Bolz. *Machine Design,* v. 17, July '45, pp. 135-138.
Statistical methods of investigation and control provide the fundamentals for the quality gage of a production machine. Problems avoided by statistical analysis.

12-154. **Metallurgical Factors of Underbead Cracking.** S. L. Hoyt, C. E. Sims, and H. M. Banta. *Metals Technology,* v. 12, June '45 T. P. 1847, 24 pp.
Relative underbead cracking tendencies of hardenable steels may be determined by a simple weld test made under carefully controlled conditions. Extent of underbead cracking, crack sensitivity, can be correlated with the dilatometric characteristics. Structure, as determined by the manufacturing and thermal history of the steel, has a marked effect upon the weld-crack sensitivity. 4 ref.

12-155. **Weldment Inspection Methods, II.** *Industry & Welding,* v. 18, July '45, pp. 40, 46, 48-51.
Destructive tests; bend test, trepanning; impact; chipping.

12-156. **The Precision 60° V-Block.** A. N. Appleby. *Machinery* (London), v. 66, June 21, '45, p. 675.
Suggests that, in addition to the normal uses to which V-blocks can be applied, if the block is made with a 60° included angle, many more uses present themselves.

12-157. **Electric Gaging Methods.** H. C. Roberts. *Instruments,* v. 18, July '45, pp. 462-465, 484, 486.
Potentiometric circuits; indicators and detectors.

12-158. **What the Executive Should Know About Quality Control.** Eugene Caldwell. *Steel,* v. 117, July 30, pp. 88, 90, 92.
Control of product quality is not confined to the inspection department but should govern the course of components from raw materials stage through to final assembly.

12-159. **Ciné Radiography.** S. L. Fry. *Metal Industry,* v. 67, July 6, '45, pp. 2-6.
Application to the investigation of metal pouring.

12-160. **Specification—Purchasing of Die Castings.** Herbert Chase. *Metals & Alloys,* v. 22, July '45, pp. 76-80.
Specifications used and their application to the purchasing of aluminum, magnesium and zinc alloy die castings.

12-161. **Sectional Radiography.** Robert Taylor. *Metals & Alloys,* v. 22, July '45, pp. 99-101.
Radiography of materials such as aircraft castings either for quality acceptance or for processing control is often complicated by the difficulty in determining the depth of defects indicated. Problem solved by the use of "sectional radiography" which is described along with a discussion of the equipment needed and the practical results obtained. 4 ref.

12-162. **Correlation Methods Applied to Steel Problems.** *Western Metals,* v. 3, July '45, p. 21.
Precautions using statistical analysis.

12-163. **Specification Requirements for Spark Testing of Insulated Wires.** *Wire & Wire Products,* v. 20, Aug. '45, pp. 566-568.
Study of electrical characteristics and speed of operation of relay of a sparker.

12-164. **Method for Checking Flush Pin Gages.** Frank Brown. *Production Engineering & Management,* v. 16, Aug. '45, p. 97.
Can be readily checked with a ground, hardened steel block as shown. Actual dimensions of the block illustrated are 3/8 in. thick, 1½ in. high and 2 in. long.

12-165. **Checking the Thickness of Cylinders by Electrical Methods.** B. M. Thornton. *Machinery* (London), v. 67, July 5, '45, pp. 9-11.
Method of testing; results of test; the importance of wall thickness.

12-166. **Preliminary Investigation of Metal Pouring by Cine Radiography.** S. L. Fry. *Foundry Trade Journal,* v. 76, July 12, '45, pp. 213-216.
Method with great possibilities for the practical foundryman, the die caster, and the metallurgist.

12-167. **Ciné Radiography.** S. L. Fry. *Metal Industry,* v. 67, July 14, '45, pp. 25-28.
Application to the investigation of metal pouring.

12-168. **Photography for Research.** S. H. Thorpe. *Iron & Steel,* v. 18, July '45, pp. 219-225, 240.
Methods used in research work in applications in the steel industry.

12-169. **Preliminary Investigation of Metal Pouring by Ciné Radiography.** S. L. Fry. *Foundry Trade Journal,* v. 76, July 19, '45, pp. 239-244.
Positive prints of the fluorescent screen for purpose of description can be divided into three tones; namely, light, medium and dark. The lightest tone, the area receiving the most X-rays, is the empty mold and runner shape. The surrounding area of medium tone is the sand comprising the remainder of the mold, while the almost black tones are the areas of metal.

12-170. **Radiography as a Control of Quality in Die Castings. Part II.** George Mullowney. *Die Casting,* v. 3, Aug. '45, pp. 60-62, 64.
Guide for the interpretation of X-ray negatives, for the user of die castings.

12-171. **Research and Quality Control of Materials.** E. H. Gurney. *Tool Engineer,* v. 14, July '45, pp. 42-46.
Thorough knowledge of quality factors provided by research, is basis of control system which assures marked increase in uniformity of product.

12-172. **Radium Examination of Welds.** Joseph S. Harris. *Welding Engineer,* v. 30, Aug. '45, pp. 40-43.
Radiography with radium has become a thoroughly tested and approved method of uncovering defective welds; tells how it is being used in structural welds, pressure vessels, machinery welds and casting repairs.

12-173. **X-Raying of Magnesium Test Bars.** Robert Taylor. *Aero Digest,* v. 50, Aug. 1, '45, pp. 101, 170.
Examines test bars for sub-surface discontinuities before subjecting them to the destructive physical test. X-ray inspection invaluable for determining, prior to physical testing, whether or not the bar itself is sound.

12-174. **X-Rays and Industrial Diamonds—II.** E. J. Tunnicliffe. *Industrial Diamond Review,* v. 4, Dec. '44, pp. 271-273. *Engineers' Digest* (American Edition), v. 2, July '45, pp. 333-334.
Investigations on tools tipped with shaped diamonds, together with brief notes on the conditions disclosed. Projecting sections of the mounted stones appear to have irregular contours. This is due to a film of vaseline covering the complete workpiece, the purpose of which was to protect them against the lead solution used for masking unwanted primary and scattered X-rays.

12-175. **Quality Control. Part II.** H. L. Collins & H. Shehyn. *Canadian Metals & Metallurgical Industries,* v. 8, July '45, pp. 20-25, 38.
Chemical laboratories; sampling and sample preparation: organization of control work; laboratory design; methods of analysis; analysis of ores; fluoride materials; miscellaneous raw materials; carbon materials; analysis of aluminum and alloys. 21 ref.

12-176. **Radiography Improves Foundry Technique.** *Canadian Metal & Metallurgical Industries,* v. 8, July '45, pp. 33-34, 36, 39, 48.
Summary of work carried out on the improvement of castings in a large foundry, the development being checked by radiography at each stage until a sound or serviceable casting was obtained. Rapid means of assessing the results by radiography enabled the working of the various alterations to be followed without the alternative expensive and cumbersome method of cutting-up.

12-177. **Gages for Quality Control.** Robert M. Hays. *Western Machinery & Steel World,* v. 36, July '45, pp. 312-313.
Use and care.

12-178. **Metal Thicknesses Determined by X-Ray.** *Steel.* v. 117, Aug. 13, '45, pp. 114, 162, 164.
Radiographic technique successfully applied to thickness measurements on hollow steel propeller blades. Possible applications include plate, tubing and strip.

12-179. **Special Double Gage Set-Up Speeds Inspection of Small Parts.** *American Machinist,* v. 89, Aug. 16, '45, pp. 102-105.
Inspectors can use both hands for simultaneous checking of two pieces. Gage combinations likewise speed inspection work.

12-180. **The Control of Tropenas-Converter Blowing by a Direct-Vision Spectroscope.** S. T. Jazwinski. Iron & Steel Institute, Advance Copy, June '45, 4 pp.
Development of a converter flame during the blow and the appearance and disappearance of certain lines of the spectrum observed through the direct-vision spectroscope. Definite relationship between the bands in the flame spectrum and the composition of the metal in the bath. This leads directly to the application of the "electric eye" to the Tropenas converter to attempt a more rigid control of the process.

12-181. **Fifty Years of Testing Service.** Charles B. Bryant. *Railway Age,* v. 119, Aug. 18, '45, pp. 289-292.
Southern's test department controls the quality of the materials purchased, investigates possibilities of new application and studies general product-serviceability.

13. TEMPERATURE MEASUREMENT AND CONTROL (PYROMETRY)

13-25. Industrial Use of Radiation Pyrometers Under Non-Blackbody Conditions. Thomas R. Harrison. *Instrumentation*, v. 1, no. 5, July-Aug. '45, pp. 7-15.

Principles of radiation pyrometry; blackbody, non-blackbody, and emittance defined; radiation from a non-blackbody in the open; radiation from a non-blackbody within a heated enclosure.

13-26. Temperature Control of Pickling Tanks. *Instrumentation*, v. 1, July-Aug. '45, p. 22.

Principles of operation.

13-27. Temperature Control Systems for Fuel Fired Galvanizing Kettles. *Instrumentation*, v. 1, July-Aug. '45, p. 23.

Temperature control system for the batch process; principles of operation; placement of thermocouples; proportioning temperature control system with automatic reset for the continuing process.

13-28. An Anticipatory Method for Improving Automatic Temperature Control. M. J. Manjoine. *Instruments*, v. 18, July '45, pp. 454-455.

Device to eliminate excessive hunting and overshooting of temperature minimizes cyclic swings in temperature characteristic of most furnace controls by anticipating changes in the main furnace temperature and initiating corrective steps.

13-29. Measurement of Heat Absorption in Furnaces: Part IV. *Industrial Heating*, v. 12, July '45, pp. 1132, 1134, 1136, 1138.

Thermal conductivity of laminated metals; theory and description of apparatus; results on tests of a laminated sheet brass.

14. FOUNDRY PRACTICE AND APPLIANCES

14-221. Making High Quality Magnesium Castings. A. Vernon Lorch. *Metals & Alloys*, v. 21, June '45, pp. 1652-1657.

Production of high quality magnesium sand castings free from undesirable contaminations and possessing good physical properties depends on control of certain factors in melting and pouring. Results of investigation and experience.

14-222. Molding Sand Properties at Elevated Temperatures. L. A. Kleber and H. W. Meyer. *American Foundryman*, v. 7, July '45, pp. 26-33.

Physical properties of bonded and unbonded molding sands at elevated temperatures presented comparatively in tabular and graphic form.

14-223. Synthetic Sand in Non-Ferrous Foundries. N. J. Dunbeck. *American Foundryman*, v. 7, July '45, pp. 40-43.

Advantages and disadvantages of naturally bonded and synthetic sands in non-ferrous foundry practice. Use of synthetic sands results in lower sand handling costs and permits of closer sand control than is possible with naturally bonded sands.

14-224. Theories of Gray Cast Iron Inoculation. H. W. Lownie. *American Foundryman*, v. 7, July '45, pp. 57-63.

Mechanics and theories of the gray iron inoculation process.

14-225. Steel for Castings. *American Foundryman*, v. 7, July '45, pp. 64-66.

Developments and trends in methods of producing steel for castings are reported. Some of the problems of current concern to steel founders—hardenability, grain size control, graphitization. 42 ref.

14-226. Photo Position Finding. *American Foundryman*, v. 7, July '45, pp. 67-71.

Method for accurate description and transmission of casting discrepancy information has been developed and is described. Working photographs illustrate the method.

14-227. Principles of Die Casting Magnesium Alloys. C. E. Nelson and R. C. Cornell. *American Foundryman*, v. 7, July '45, pp. 72-76.

Discussion of magnesium alloy die casting production methods; alloys used; equipment and materials; operating practice; sizes and tolerances; machining and finishing.

14-228. Consider These Factors in Designing Products for Die Casting. *Steel*, v. 117, July 23, '45, pp. 114-116, 118, 120.

Before launching plans for new products, manufacturers can take advantage of the possibilities and avoid the limitations of the die casting process by studying these fundamental data assembled by the technical staff of the New Jersey Zinc Co.

14-229. Specifications for Ampoloy Continuous Cast Rod. *Aviation*, v. 44, July '45, p. 205.

These continuous cast bronzes, adapted for use in automatic screw machines, are produced by continuous withdrawal through the bottom of a casting crucible, thence passing through a cooled die which gives required finish and accuracy.

14-230. Precision Founding. Francis Dittmar. *Iron Age*, v. 156, July 26, '45, pp. 70-73.

Preparation of the plaster from which try patterns are made in the glue mold.

14-231. Die Casting Machine Development, Past and Future. H. K. Barton. *Machinery* (London), v. 66, June 28, '45, pp. 716-719.

Suggests likely avenues along which the development of die-casting machines may be expected to proceed.

14-232. Tentative Recommended Methods for Casting Cast-Iron Test-Bars. *Foundry Trade Journal*, v. 76, June 28, '45, pp. 175-176, 180.

Report intended to give guidance and information to those in difficulty.

14-233. The Gating of a Large Magnesium Casting. Athony Cristello. *Aluminum and Magnesium*, v. 1, July '45, pp. 18-20.

Casting produced by using a dry sand or all core mold. All the gating, risering and chilling for the casting was contained in the dry sand cores. Gating and risering procedure resolved into two interrelated problems.

14-234. Consider These Factors in Designing Products for Die Casting. *Steel*, v. 117, July 30, '45, pp. 104, 106, 109, 112.

Additional fundamental data are presented on possibilities and limitations of the die casting process.

14-235. Commentary on Pressure Die Casting. E. Carrington. *Light Metals*, v. 8, July '45, pp. 342-347.

Observations on a paper by J. L. Erickson.

14-236. Effective Shrink-Box Risers. Henry C. Winte and Tom Barlow. *Foundry*, v. 73, Aug. '45, pp. 82-86, 220, 222, 224.

Large percentage of porosity defects are directly attributable to poor gating and feeding design; theoretically and practically possible to design a system of gating and feeding which will cover a wide range of sizes, shapes, and metal characteristics if the principles of directional solidification are properly taken into account. 4 ref.

14-237. Metallurgy of Iron and Steel for Castings. J. E. Hurst. *Foundry*, v. 73, Aug. '45, pp. 90-91, 208.

Foundries adjusted to changed conditions prefer granular form ferrosilicon.

14-238. Non-Ferrous Foundry Progress. Frank Hudson. *Foundry*, v. 73, Aug. '45, pp. 92-93, 163, 164, 166.

Bronze and gunmetal castings; brass castings; special alloy castings; light alloy castings; adopt improved pouring practice; new inspection methods; effect in the postwar period. 5 ref.

14-239. Foundry Research at Battelle Memorial Institute. Edwin Bremer. *Foundry*, v. 73, Aug. '45, pp. 94-95.

Research facilities for the development of improved foundry practices and products.

14-240. The Cumulative Curve for Foundry Sand Control. Robert E. Morey and Howard F. Taylor. *Foundry*, v. 73, Aug. '45, pp. 98-101, 250, 252, 254, 256, 258, 260, 262, 264.

Technique for evaluating foundry sands and other particular foundry materials is intended to facilitate and improve control over the materials and provide a basis for adequate specifications governing their purchase. Because it opens a new approach to the classification of sand, clay, silica flour, this discussion is presented in order to stimulate wider study of the entire subject. 66 ref.

14-241. Mechanizing the Small Jobbing Foundry. W. S. Thomas. *Foundry*, v. 73, Aug. '45, pp. 109-110, 168, 172.

Layout shown.

14-242. Precision Founding. Francis Dittmar. *Iron Age*, v. 156, Aug. 2, '45, pp. 51-57.

Making of plaster-base investment molds. With the use of auxiliary examples shows how skillful employment of concealed venting and "cradles" make for the reduction of gas pressures on the mold walls.

14-243. Design Considerations for Die Casting. H. W. Fairbairn. *Production Engineers' Journal*, v. 23, Nov. '44. *Engineers' Digest* (American Edition), v. 2, July '45, pp. 336-341.

Advantages of the pressure over the gravity casting process; improved surface finish; improved dimensional accuracy; ability to produce thinner wall sections; considerably improved rates of production. Hot chamber machines; goose-neck machines; cold chamber process.

14-244. The Future of the Light Alloy Foundry Industry. W. C. Devereux. *Machinery* (London), v. 67, July 5, '45, pp. 12-16.

Way in which mechanization has been employed to achieve very high outputs despite the shortage of skilled foundry workers. Merlin engine crankcase; alloys and alloy development; secondary alloys; magnesium alloys; research. (From Institute of British Foundrymen.)

14-245. The Future of the Light Alloy Foundry Industry. W. C. Devereux. *Foundry Trade Journal*, v. 76, July 5, '45, pp. 191-200.

Its important part in the critical years which lie ahead.

14-246. Consistency and the Cupola. C. A. Payne. *Foundry Trade Journal*, v. 76, July 5, '45, pp. 201-203.

Coke size variation; air supply; boshed wells; starting up details; torch lighting of cupolas; bosh profile.

14-247. Microporosity in Magnesium Alloy Castings. *Metallurgia*, v. 32, June '45, pp. 69-70.

Principal problem in casting magnesium alloys is microporosity which causes leakage when the castings are used for a number of purposes. The investigation was carried out to determine the primary causes of microporosity and to develop remedies. Conclusions and recommendations have resulted from facts observed in the study.

14-248. Silico-Fluorides and Compounded Inhibitors in Magnesium Casting. W. Wade Moss. *Light Metal Age*, v. 3, July '45, pp. 17-23, 44.

Sands, their handling, and preparation; general foundry practice and common inhibitors used in magnesium casting. Describes the preparation, function and advantages of silico-fluoride inhibitors.

14-249. The Problem of the Measurement of Cupola Air Supply. H. Pinchin. *Foundry Trade Journal*, v. 76, July 12, '45, p. 219.

Quantity of air delivered; solution to the problem; interpretation of blast records.

14-250. Chill-Cast High Tin Bronze. W. T. Pell-Walpole. *Metal Industry*, v. 67, July 13, '45, pp. 18-20.

Melting procedure determines the soundness and working properties of 14% tin bronze. Soundest and cleanest ingots are obtained by the use of solvent oxidizing-flux processes with efficient deoxidation. 5 ref. (From Institute of Metals.)

14-251. An Investigation of the Constitution of Certain Foundry Bonding Clays. R. W. Grimshaw and A. L. Roberts. *Foundry Trade Journal*, v. 76, July 19, '45, pp. 233-238.

Mineralogical nature of a clay by simple laboratory methods. 6 ref.

14-252. Microporosity. E. A. G. Liddiard and W. A. Baker. *Metal Industry*, v. 67, July 20, '45, pp. 34-37.

Occurrence of microporosity is largely due to the last fluid portions of the casting draining away from unfed sections. This effect is enhanced in magnesium alloys because of their more rapid solidification. Result of an investigation made to find the causes and possible cure of the trouble. (From Institute of British Foundrymen.)

14-253. Mold and Core Paints and Washes, and Parting Powders. W. J. Rees. Iron & Steel Institute, Advance Copy, June '45, 4 pp.

Investigation on non-siliceous alternatives to silica flour for parting powders and mold and core paints. Alternatives to silica flour for parting powders which are quite satisfactory in foundry use are indicated. The trials made with mold and core paints indicate that silica flour can be satisfactorily replaced by non-siliceous materials. Calcined ball clay or aluminous fireclay is satisfactory for small and medium steel castings; for larger castings sillimanite, calcined or fused, and zircon have given satisfactory results.

14-254. Microporosity—Cause and Control in Magnesium Alloys. E. A. G. Liddiard and W. A. Baker. *Metal Industry*, v. 67, July 27, '45, pp. 56-58.

Cause and effects of microporosity in magnesium and aluminum alloys; mode of solidification, effect of beryllium, chill casting and alloy deficiencies in the later solidifying portions of the castings.

14-255. Precision Founding. Francis Dittmar. *Iron Age*, v. 156, Aug. 16, '45, pp. 70-74.

Theory and practice of precision casting; the author continues his discussion on making of matrices, modeling of waxes, plaster carrying and production sequences in casting.

14-256. Microporosity. E. A. G. Liddiard and W. A. Baker. *Metal Industry*, v. 67, Aug. 3, '45, pp. 70-71.

Cause and control in magnesium alloys; explanation of differences; technique of casting; foundry application.

15. SALVAGE AND SECONDARY METALS

15-27. Repair of Malleable Iron Castings. *Foundry*, v. 73, Aug. '45, pp. 111, 224, 226, 228, 230.

Repair of imperfections in ferrous castings; procedure accompanies a proposed Engineering Bulletin instructing prime contractors on information to be furnished in seeking approval of repair practices, and is intended as a general guide as to types and extent of repairs that will be considered.

15-28. Repair of Defective Gray-Iron Castings. S. H. Brams. *Iron Age*, v. 156, Aug. 9, '45, pp. 74-75.

Cold welding; repair by brazing.

15-29. Reconversion Bulletin, No. 1. *Metals & Alloys*, v. 22, July '45, pp. 110-122.

Planning and preparation; disposing of government-owned equipment; purchasing government-owned equipment for reconversion; reconverting the equipment; storage of machine tools (not government-owned).

15-30. Remelting and Reclaiming Aluminum Scrap. Rolland R. LaPelle. *Aluminum & Magnesium*, v. 1, July '45, pp. 21-24.

Outlines considerations involved in the handling and reclaiming of aluminum scrap material, and the treatment required to turn these materials into first quality aluminum alloy pig which can be used for highly stressed and critical items.

16. FURNACES AND FUELS

16-89. High Frequency Induction Heating. Wesley M. Roberds. *Mechanical Engineering*, v. 67, July '45, pp. 448-451.

Radiation method; high frequency induction heating; limiting factors in induction heating; intensity factors; control factors; range of frequencies used; hardening thin shells; effects of frequency.

16-90. Magnetic Controls for Electric Furnaces. G. W. Heumann. *Metals & Alloys*, v. 21, June '45, pp. 1637-1642.

Electric furnaces for hardening, annealing, brazing, etc. generally require automatic control, which is usually magnetic control by means of contactors. The types, performance ratings and applications of such magnetic controls, and the control panels and other accessories used are described.

16-91. Practical Experiences With the Old-Type Cupola and the New Balanced Blast Cupola. T. Begg. Institute of Australian Foundrymen: *Australasian Engineer, Science Sheet*, Jan. 7, '45, pp. 2-6. Iron and Steel Institute *Bulletin*, no. 113, May '45, p. 3-A.

Some experiences in the successful operation of a balanced-blast cupola in Australia are related. The melting capacity was 13.3 tons per hr. The temperature of the metal remained consistently high (from 1389 to 1429°C.) from the first tap to the end of the melt. The cupola could be stopped for periods of 30 to 40 min. without any serious drop in the temperature of the metal. The amount of slag which was "fluxed" or "slagged" away from the slag hole was much more with the balanced-blast cupola than with old-type cupolas.

Metal Literature Review—*Continued*

16-92. **The Control of Furnace Dampers.** *Wire Industry*, v. 12, July '45, pp. 361, 363.
New departure.

16-93. **Observations on Gas Flow and Coke Consumption in the Blast Furnace.** Kurt Neustaetter. *Blast Furnace & Steel Plant*, v. 33, July '45, pp. 825-829.
Use of undersize coke in the blast furnace; case of furnace operating poorly with extremely low coke rate; another case where increased furnace efficiency was detrimental to gas flow; observation on dry blast operation with low moisture (1 to 2 grains). 6 ref.

16-94. **Developments in Rotary Hearth Furnaces.** J. H. Loux. *Iron & Steel Engineer*, v. 22, July '45, pp. 52-61.
Why a rotary furnace is used and what its advantages are over other types of furnaces. Five basic applications for rotary hearth furnaces.

16-95. **An Analysis of Open-Hearth Combustion.** Gilbert E. Seil. *British Steelmaker*, v. 11, July '45, pp. 308-312.
Multiple burners firing crosswise over open-hearth bath afford increased rate of heat transfer and more tons of steel per hour. Preheated air is supplied either by checker chambers of reversible furnace or by recuperation of one-way furnace.

16-96. **Immersion Tube Heating With Gas.** Maurice J. Dewey. *Western Metals*, v. 3, July '45, pp. 17-18.
Objectives of immersion heating and the factors involved in acquiring them.

16-97. **New Open-Hearth Furnaces.** H. J. Pugsley. *Instrumentation*, v. 1, no. 5, July-Aug. '45, pp. 3-4.
At Homestead Works of Carnegie-Illinois Steel Corp.; their instrumentation.

16-98. **Open-Hearth Furnace Pressure Control System.** *Instrumentation*, v. 1, July-Aug. '45, p. 19.
Description of the control system; how the control system works; characteristics.

16-99. **Induction and Dielectric Heating Equipment.** *Electronics*, v. 18, Aug. '45, pp. 110-111.
Tabular comparison of technical characteristics and initial cost per kilowatt of output power for commercially available induction and dielectric heating equipment, as reported by manufacturers. Both electronic and non-electronic types are covered.

16-100. **Heating Metal With Cold Coils.** *Production Engineering & Management*, v. 16, Aug. '45, pp. 114, 116.
Induction heating, using high frequency alternating current, makes the metal heat itself. A magnetic field is set up around the coil, which is reversed with each alternation of current. Atomic agitation of metal produces rapid heating.

16-101. **Operation of 4-Ton Open-Hearth.** H. K. Work and W. R. Webb. *Iron Age*, v. 156, Aug. 2, '45, pp. 42-47.
Construction and operating characteristics of J & L's experimental 4-ton open-hearth furnace, which has produced over 2100 tons of plain, medium, and high carbon steels, free-cutting steels, and high alloy steels. (American Institute of Mining & Metallurgical Engineers.)

16-102. **Wright Aeronautical Corp. Uses Large Battery of Nitriding Furnaces.** J. A. Schneider. *Industrial Heating*, v. 12, July '45, pp. 1150, 1152.
Designed to reduce ammonia consumption. Uniformity of hardness and case depth has been improved because of the better operating characteristics of the furnaces. Various views of some of the furnaces and auxiliary equipment are shown.

16-103. **A Completely Automatic Control of Open-Hearth Reversal.** B. M. Larsen and W. E. Shenk. *Industrial Heating*, v. 12, July '45, pp. 1164, 1166, 1168, 1172.
Factors related to the automatic control of open-hearth furnace reversal, and some practical developments in the control of this phase of furnace operation.

16-104. **Modern Melting and Heat Treating Equipment in the Dodge Aluminum Foundry.** *Industrial Heating*, v. 12, July '45, pp. 1189-1190, 1192, 1194-1196, 1198.
Melting furnaces; solution heat treatment oven; aging oven.

16-105. **The Role of Frequency in Industrial Dielectric Heating.** G. W. Scott. *Electrical Engineering*, v. 64, Aug. '45, pp. 558-562.
Equations for development of dielectric heat; variables in heat equation not independent of frequency; limitations of increased frequency; choice of frequency. 3 ref.

16-106. **Design of Induction Heating Coils for Cylindrical Non-Magnetic Loads.** J. T. Vaughan, and J. W. Williamson. *Electrical Engineering*, v. 64, Aug. '45, pp. 587-592.
Equations for the calculation of the required number of coil turns to match a given power source for solenoidal coils with coaxial cylindrical loads of non-magnetic materials in electromagnetic induction circuits. Correction factor is established for coil shortness. Equations given for power distribution and impedance values. 5 ref.

16-107. **Basic Principles of Combustion Engineering of Hot-Dip Galvanizing Furnaces. Part XXX.** *Industrial Gas*, v. 24, July '45, pp. 20-21, 29.
Galvanizing furnaces, electrically heated. 5 ref.

16-108. **Gas Flow and Coke Consumption in the Blast Furnace.** Kurt Neustaetter. *Steel*, v. 117, Aug. 20, '45, pp. 153-154, 157, 184.
Minimum coke consumption and maximum blast furnace production frequently are determined by an orderly gas flow controlled by physical make-up of stock. Observations on the use of dry blast with moisture content of 1 to 2 grains per cu. ft. during summer and winter are presented. 6 ref.

17. REFRACTORIES AND FURNACE MATERIALS

17-39. **Special Brick Shapes for Cupola Refractories.** H. M. Hazeltine. *American Foundryman*, v. 7, July '45, pp. 44-45.
Over a period of years, considerable difficulty had been experienced in cupola operations because of tap hole, trough, slagging spout and cupola wall refractory failures. Use of firebrick shapes, specially designed for particular applications, eliminated the refractory troubles and made possible substantial operating economies.

17-40. **English Blast Furacemen Study Carbon Brick for Hearth Lining.** *Steel*, v. 117, July 23, '45, pp. 125, 128.
Investigation of carbon brick for lining blast furnace hearths stresses the importance of accuracy of shape and size. Use of preformed carbon for lining iron and slag runners holds promise. Patching, hearth lining with carbon brick eliminates breakouts at that area.

17-41. **Developments in the Use of Lumnite Cement at Gary Works Coke Plant.** James E. Ludberg. *Blast Furnace & Steel Plant*, v. 33, July '45, pp. 830-834.
Oven door linings; procedure for lining doors; miscellaneous maintenance uses of lumnite; construction uses of lumnite; corrosion resistant concrete uses.

17-42. **Hot Patching of Open-Hearth Furnaces.** Edwin N. Hower. *Steel*, v. 117, July 30, '45, p. 103.
Types of roof patches; furnace cost curve. Paper presented before Open Hearth Committee, American Institute of Mechanical Engineers, Pittsburgh).

17-43. **Industrial Electrodes, II.** H. Sanders. *British Steelmaker*, v. 11, July '45, pp. 303-307.
Electrode tolerances; how the electric furnace began; experimental work; furnace progress; continuous electrodes; linking pin; counterboring; properties of carbon electrodes; electrical resistivity.

18. HEAT TREATMENT

18-177. **Unique Heating Equipment Speeds Heat Treating.** Gunnar Skog. *Tool Engineer*, v. 14, June '45, pp. 37-38.
A General Electric roller-hearth electric furnace, with loading and control stations, and a quench chamber. Latter includes an unique, automatic water spray quench which minimizes the distortion that often results from quenching. Also includes a push button controlled load truck which eliminates the human factor in addition to providing a centralized operating position.

18-178. **The Influence of the Heat Treatment of Steel on the Damping Capacity at Low Stresses.** L. Frommer and A. Murray. Iron and Steel Institute Paper, Dec., '44, *Engineer's Digest*, (American Edition), v. 2, June '45, pp.303-305.
Experimental method adopted consists in supporting the material in such a manner as to facilitate its executing vibrations of a "free-free" character. The bar is forced into oscillation at one of its natural frequencies by an electromagnetic method, and the existence of such oscillation detected similarly. Determinations are made by noting the time required for the vibration amplitude to fall to half of an arbitrary initial amplitude subsequent to cutting off the driving power.

18-179. **Flame Hardening on Railroads.** Arthur Havens. *Welding Engineer*, v. 30, July '45, pp. 35-39.
Oxygen and acetylene are supplying an important new service to railroad maintenance. All types of locomotive and many passenger and freight car parts are being flame hardened for increased wear resistance.

18-180. **Agitation for Effective Quenching.** R. B. Seger. *Steel*, v. 117, July 23, '45, pp. 110, 154.
Produces uniform results in heat treating.

18-181. **Flame Hardening of Sprockets.** S. S. *Machinery* (London), v. 66, June 21, '45, pp. 669-674.
Describes in some detail the methods applied in the flame hardening of sprockets; manual method of spot hardening using one burner; manual method of spot hardening using two burners; fully automatic mechanical method with stationary burners; electric timers and air controls; progressive hardening method.

18-182. **An Appraisal of Subzero Hardening of High Speed Steel.** J. G. Morrison. *Iron Age*, v. 156, July 26, '45, pp. 54-59.
Summarizes accepted theory and facts regarding the process and points out secondary factors which may have been overlooked; theory of hardening steel and the role that carbon plays are reviewed in order to clarify some independent research reported in the second article to follow.

18-183. **Heat Treatment of Magnesium Alloy Castings.** *Light Metals*, v. 8, July '45, pp. 318-341.
Technique and plant requirements for the heat treating of ultra-light alloy castings; use of inert atmospheres.

18-184. **Heat Treating Magnesium Alloys.** *Steel*, v. 117, Aug. 6, '45, p. 124.
Elevator-type furnace holds temperatures within narrow range and produces parts with maximum physicals obtainable.

18-185. **Avoiding Decarburization in Heat Treating High Speed Steel Tools.** *Steel*, v. 117, Aug. 6, '45, p. 126.
High speed steel tools of all types—tungsten, molybdenum or cobalt—are being heat treated in production electric furnaces. No surface change occurs except a slight discoloration which becomes apparent when the tool is transferred from furnace to quench bath. Cutters of all types are made uniformly hard to the sharpest point.

18-186. **Atmospheres for Annealing Metals.** C. E. Peck. *Metals & Alloys*, v. 22, July '45, pp. 85-91.
Several types of controlled atmospheres used in the annealing and normalizing of ferrous and non-ferrous metals to keep them clean or bright and to prevent their decarburization (if ferrous) are classified and their specific applications discussed.

18-187. **Sub-Critical Annealing.** E. E. Howe. *Iron Age*, v. 156, Aug. 9, '45, pp. 52-55.
Procedure has been used on wide variety of steel compositions with resultant increased ductility, improved formability, and lower cost. Summarizes advantages.

18-188. **An Appraisal of Subzero Hardening of High Speed Steel.** J. G. Morrison. *Iron Age*, v. 156, Aug. 2, '45, pp. 64-70.
Points out the difficulty of properly hardening high speed steel tools and illustrates a condition where subzero cooling might prove distinctly beneficial. Effects of cold treatment are brought out strikingly on experimental high speed steels in which the carbon content is kept deliberately high in order to insure an excessive amount of retained austenite upon hardening. Increase in hardness as well as in size testifies to the marked effect that treating such specimens at −120° F. has on the transformation of austenite. 9 ref.

18-189. Selection of Steel for Induction Hardening. Elbert A. Hoffman and John M. Birdsong. *Tool Engineer*, v. 15, Aug. '45, pp. 27-29.
Metallurgical factors affect applications and permit wider choice of steel.

18-190. Furnaces and Heat Treatment for Permanent Mold Magnesium Castings. A. V. Keller. *Modern Metals*, v. 1, Aug. '45, pp. 20-21, 23.
Building and operation of a heat treating furnace and gives some of the causes contributing to substandard castings.

18-191. The Plus and Minus of Induction Heating. *Industrial Gas*, v. 24, July '45, pp. 16, 17, 29.
Discusses high frequency induction heating and three types of modern high frequency equipment.

18-192. Application of Controlled Atmospheres to the Processing of Metals. C. E. Peck. American Society of Mechanical Engineers *Transactions*, v. 67, Aug. '45, pp. 501-512.
Separately controlled atmospheres for use in conjunction with heat treating processes. By means of controlled atmospheres, finished machine parts which require heat treatment can be processed without loss of surface hardness during heating, and without further grinding or cleaning. Outlines the principal types of atmospheres and describes briefly the equipment available for producing these atmospheres.

18-193. Production Heat Treatment of Gears. *Steel Processing*, v. 31, July '45, pp. 449-454.
Important factors which govern the classification and ultimate selection of materials for gears. Case hardening steels; carbon content of carburizing steels; the grain size of case hardening steels; alloy case hardening steels; effect of alloy additions; full hardening steels; recommended gear materials; distortion; preliminary normalizing and annealing; uniformity of heating; design and heat treatment.

18-194. Induction Heating in Aluminum Fabrication. Gilbert C. Close. *Light Metal Age*, v. 3, July '45, pp. 8-10, 50.
Aspects of induction heating, its present applications in the field of aluminum fabrication; and indicates some of the electromagnetic principles with which the aluminum metallurgist should acquaint himself.

18-195. The Purnell Process for Heat Treating Steel. C. G. Purnell and H. M. Pfahl. *Industrial Heating*, v. 12, July '45, pp. 1116, 1118, 1120, 1122, 1124, 1126, 1128, 1130.
Represents a step toward perfection in which control of the quenching phase of the heat treating operation is exercised to a much higher degree, with an attendant improvement in uniformity of product.

18-196. Electric Salt Bath Furnace With Four Pots Provides Flexible Operation. F. J. Skerritt. *Industrial Heating*, v. 12, July '45, pp. 1170, 1172.
A four-pot electrically heated salt bath furnace, with each pot heated by its own set of immersed electrodes.

18-197. Wide Range of Furnace Types Broadens Scope of Lindberg Steel Treating Work. *Industrial Heating*, v. 12, July '45, pp. 1216-1218, 1220, 1222, 1224, 1226-1227.
Describes furnaces and other equipment installed in the Lindberg plant for the performance of various commercial heat treatments.

18-198. Sub-Zero Tool Treatment—Some Practical Aspects. F. T. Dean. *Western Machine & Steel World*, v. 36, July '45, pp. 298-301, 328.
Basic facts in evaluating the possible benefits from cold treating.

18-199. Tank Quenching of Heat Treated Aluminum. *Western Machinery & Steel World*, v. 36, July '45, pp. 322-323, 327.
El Segundo Plant of the Douglas Aircraft Co. has developed a tank quenching mechanism for box type air ovens which meets the requirements and which eliminates most of the drawbacks of other means of heat treating and quenching formed aluminum alloy parts.

18-200. Heat Treatment. *Automobile Engineer*, v. 35, July '45, pp. 281-282.
Current practice in the reduction of distortion; nonsimultaneous phase changes; temperature gradient; gradients during the heating cycle; salt baths; atmosphere furnaces; hot quenching; important factors for the avoidance of distortion; effect of surface finish; carburizing; equipment.

18-201. Cyanide Nitriding Increases Hardness of High Speed Cutting Tools. John E. Lynch and Carl W. Snyder. *American Machinist*, v. 89, Aug. 16, '45, pp. 124-126.
Five-point method of chemical treatment which augments the regular hardening processes.

19. WORKING

Rolling, Drawing, Pressing, Forging

19-217. Production Planning for a Rubber-Press Department. Edwin H. Schaeffer and Walton Hughes. *American Machinist*, v. 89, July 19, '45, pp. 105-109.
Attracted by low tooling cost, many concerns are interested in forming aluminum by the rubber-press method. Discusses economics involved.

19-218. Metallurgical Problems in the Manufacture of Seamless Gun Tubes. Joel C. Carpenter. *Metal Progress*, v. 48, July '45, pp. 67-72, 112.
Description of process; metallurgical factors; chemistry; hardenability; steelmaking practice; rolling mill practice piercing; auxiliary operations.

19-219. Forming Stainless Steel with Zinc Alloy Dies. W. W. Broughton. *Metals & Alloys*, v. 21, June '45, pp. 1626-1630.
Advanced practice in using zinc alloy dies on stainless steel parts and a review of the general characteristics and uses of these inexpensive but durable die materials.

19-220. Rolled Threads. William T. Taylor. *Metals & Alloys*, v. 21, June '45, pp. 1643-1647.
High speed production of threads by rolling is a modern development that matches the fast production of cold headed blanks. The calculation of blank diameters for different materials, types of part (screw, stud, tap, etc.) fits, etc. is a complex problem and formulas and tables are given to aid the designer in his planning.

19-221. Forging Magnesium Alloys. *Metals & Alloys*, v. 21, June '45, p. 1671.
Designation; nominal chemical composition.

19-222. Deep Drawing Filter Cases, I. Carl J. Nagel. *Tool & Die Journal*, v. 11, July '45, pp. 98-103.
Press-working of the case for the Fram type F4 filter.

19-223. Early Wire History. *Wire Industry*, v. 12, July '45, pp. 355-356.
Tintern mill; first steel wire drawing; Horsfall's invention; rope wire; Atlantic telegraph cables; testing; overdrawing.

19-224. Patenting. *Wire Industry*, v. 12, July '45, p. 358.
Comparison of methods.

19-225. Continuous Drawing of A. P. Shot. C. A. Litzler. *Steel*, v. 117, July 30, '45, pp. 100, 126.
Holds down fuel consumption, provides flexible heat treating cycle.

19-226. The Rolling of Metals. L. R. Underwood. *Sheet Metal Industries*, v. 22, July '45, pp. 1167-1176, 1184.
Tests show that the deformation of a loosely fitting plug or screw, or one that is of a different material from the bar, may not give a true picture of internal flow. That plugs or screws are apt to be loosened during rolling is shown by Metz's tests, in which the loosening of the screws was taken as an indication of the stresses to which the material was subjected. 50 ref.

19-227. Standard Dimpling Methods Adapted for 75S-T Aluminum Sheet. Kirby F. Thornton. *American Machinist*, v. 89, Aug. 2, '45, pp. 106-108.
Existing equipment and methods inadequate for dimpling 75S-T sheet. Seek method which will be adaptable to a wider range of shop production conditions.

19-228. Plastic Bending—Further Considerations. Wm. R. Osgood. *Journal of the Aeronautical Sciences*, v. 12, July '45, pp. 253-262, 272.
General relation between moment and curvature for sections the widths of which are expressible as polynomials of any order. Specific solutions are given for five symmetric cross-sections, including two sections bounded laterally by arcs of parabolas, and for six unsymmetric cross-sections, including the triangular section and two sections bounded laterally by arcs of parabolas.

19-229. West Coast Steel Mill. G. Eldridge Stedman. *Steel*, v. 117, Aug. 6, '45, pp. 130, 133, 159-160, 162, 164.
Production of many different items in modern wire mill, details facilities and practice of Columbia Steel Co. near San Francisco.

19-230. The Elements of Wire Drawing. *Tool Engineer*, v. 14, July '45, pp. 40-41.
Types of equipment; reduction explained by geometrical progression.

19-231. Dies Made From Cerrobend. K. C. C. *Machinery*, (London), v. 67, July 5, '45, pp. 1-6.
Cerrobend is an alloy containing 26.7% lead, 13.3% tin, 10% cadmium, and 50% bismuth. Possesses physical properties that make it suitable material from which to produce hand-forming, hydraulic press, and drawing dies. Mechanical properties of the alloy; bending thin materials; using a part as the pattern.

19-232. New Finish for Sheet Metal. *Sheet Metal Worker*, v. 36, July '45, pp. 39, 72.
Rolling designs into sheet metal adds strength, lends eye-appeal and serves other useful purposes.

19-233. Short-Cut for Making a 90° Five-Piece Reversed Oblong Transition Elbow for Fitting to a Flat Surface. *Sheet Metal Worker*, v. 36, July '45, pp. 51-52.
Time-saving method which includes simple offsets to fittings. Only experience necessary to develop patterns by this method is the ability to draw a true plan and elevation of the fitting for which the pattern is desired.

19-234. Bibliography on Cold Heading and Cold Forging. *Metallurgia*, v. 32, June '45, p. 52.
List of references on the subject covering the period 1933-1943.

19-235. Wire Drawing. W. F. Randall. *Metal Industry*, v. 67, July 27, '45, pp. 50-52.
Methods by which the process has been speeded up. Cleaning; surface treatment and lubrication.

19-236. Master Rod Forging at Chevrolet. P. D. Aird. *Modern Industrial Press*, v. 7, July '45, pp. 13-14, 16.
Production of major component parts for their final assembly.

19-237. Deep Drawing Filter Cases, Part II. Carl J. Nagel. *Tool & Die Journal*, v. 11, Aug. '45, pp. 99-103.
Blanking and three-operation draw of the Type F-31 Fram Filter.

A.S.M. Review of Current Metal Literature — *Continued*

19-238. **Dimpling New High-Strength Aluminum Alloys.** *Western Machinery & Steel World*, v. 36, July '45, pp. 320-321.
New method utilizes a tool which fits the standard dimpling machine. Procedure is simple, inexpensive and rapid, and is easily taught to the operator. It produces strong, well-formed dimples in high strength aluminum alloys without radial or circumferential fractures.

19-239. **Dimensioning of Rough Forgings to Assure Metal for Finishing.** Frank M. Mallett. *Product Engineering*, v. 16, Aug. '45, pp. 552-553.
Method of approach and general solution of a typical problem of determining nominal dimensions and tolerances on forgings so that any combination of tolerances will leave enough material for machining.

19-240. **Production Processes—Their Influence on Design. Part II.** *Machine Design*, v. 17, Aug. '45, pp. 113-118.
Spinning; unusual shapes practical; streamlined curves advantageous; gage variation affects tolerances.

19-241. **Flexible Tools for Stamping Light Metals.** *Modern Metals*, v. 1, Aug. '45, pp. 14-15.
Developments of light metal stamping methods during this war have helped out costs of materials previously fabricated by other methods. Outlines some of the early problems and tells of some tooling developments which have aided in cutting costs for temporary or short-run jobs.

19-242. **Buick Forges Aluminum Pistons for Pratt & Whittney Aircraft Engines.** *Industrial Heating*, v. 12, July '45, pp. 1108-1110, 1112, 1114, 1130.
Forging press and dies; heating furnace for billets.

19-243. **Lubrication in the Drawing of Metals.** Samuel Spring. *Steel*, v. 117, Aug. 13, '45, pp. 108-109, 154, 156.
New data based upon original research at Frankford Arsenal which will prove useful in solving lubrication problems in the drawing of copper-base alloys. 3 ref.

19-244. **Diamond and Sintered Carbide Wire-Drawing Dies—Their Maintenance and Use.** *Industrial Diamond Review*, v. 5, July '45, pp. 145-147.
Suggestion for correct use and subsequent treatment of diamond and sintered carbide dies.

19-245. **Steel Roll Manufacture and Application.** *Industrial Heating*, v. 12, July '45, pp. 1160, 1162.
Manufacturing processes involved in the manufacture of steel rolling-mill rolls, and some of the factors determining their suitability for certain applications.

19-246. **Wire Drawing. W. F. Randall.** *Metal Industry*, v. 67, Aug. 3, '45, pp. 66-69.
Mechanism of lubrication and the design and manufacture of dies. Methods of annealing also described.

19-247. **Ultimate Shear Strength of Materials.** John E. Capell. *Tool Engineer*, v. 15, Aug. '45, p. 41.
Shear, on punches and dies, increases press capacity.

19-248. **Hot Forming Magnesium Alloy Sheet.** *Iron Age*, v. 156, Aug. 16, '45, pp. 56-61.
Hot forming of magnesium alloy sheet using electrically heated tools is showing particular efficiency. Data presented on temperatures, heating methods, types of forming, gage of material, and most satisfactory lubricants.

19-249. **Lubrication in the Drawing of the Metals. II.** Samuel Spring. *Steel*, v. 117, Aug. 20, '45, pp. 134-136, 138, 185.
Lubrication by soap dispersions in water and commercial emulsion lubricants in drawing of brass. E. G. Budd test described. 7 ref.

19-250. **Automatic Screwdown Control.** A. F. Kenyon and W. G. Cook. *Steel*, v. 117, Aug. 13, '45, pp. 124, 127-128, 170, 172-173.
Preset control applied to 132-in. reversing universal plate roughing mill arranged to automatically move the screws to preselected settings for each pass in the rolling schedule. Speed of screwdown drive is reduced as it approaches selected pass position to effect accurate stop at selected position. Equipment described and method of operation explained in detail.

20. MACHINING AND MACHINE TOOLS

20-306. **Maximum Results from the Borizing Process.** C. G. Nordmark. *Machine Tool Blue Book*, v. 41, July '45, pp. 201-202, 204, 206, 208, 210, 212, 214, 216, 218, 220.
Tells which materials can be successfully borized, and how the characteristics of the material affect the type of tool to use, as well as the speeds, leads and depth of cut.

20-307. **Recent Progress in Milling Machine Operations.** C. W. Hinman. *Machine Tool Blue Book*, v. 41, July '45, pp. 245-246, 248, 250, 252, 254, 256.
A few of the major ones discussed.

20-308. **Preventing Cracks in Cemented Carbide Tools.** William Newcomer. *Machine Tool Blue Book*, v. 41, July '45, pp. 281-282, 284.
New method of brazing cemented carbide tips to tool shanks is designed to permit heavier cutting and to increase tool life.

20-309. **Carbide Cutters—Their Application and Selection.** Anders Jansson. *Tool Engineer*, v. 14, June '45, pp. 24-28.
Factors in selecting grades; no vibration or chatter; negative rakes in milling; honing increases tool life; selecting the grades; selection charts.

20-310. **Tracer Controlled Milling.** Andrew E. Rylander. *Tool Engineer*, v. 14, June '45, pp. 30-33.
Modern profilers in both actual size and pantograph types assure speed and accuracy in duplicating irregular work.

20-311. **Broaching Solves Difficult Production Problem.** Joe Dostal. *Tool Engineer*, v. 14, June '45, pp. 34-37.
An achievement in tool engineering, in which quality and high production are attained through unusual applications of usual techniques.

20-312. **The Engineering Approach to Machine Tool Selection.** Edwin Laird Cady. *Metals & Alloys*, v. 21, June, '45, pp. 1620-1625.
Application of engineering principles and control in the processing of their materials and the fabrication of their products. Shows how and why it has affected metal-working's No. 1 production method—machining—and the selection of the equipment. Aids the engineer in meeting these fuller responsibilities through better over-all production planning, better machine tool selection, better machine tool design and better machine tool use and operation.

20-313. **Balanced Linkage Obviates Thrust on Frame.** Paul S. Jackson. *Machine Design*, v. 17, July '45, pp. 117-120.
Importance of firmly anchoring the copper "rotating band" on large caliber Navy shells necessitated the development of special shell-notching machines. Automatic cycling is utilized which indexes for each notching stroke and stops after the entire periphery is notched.

20-314. **Clutches and Couplings Produced Rapidly on Standard Gear Machine.** Ernest Wildhaber. *American Machinist*, v. 89, July 19, '45, pp. 110-112.
Better finish and greater load carrying capacity are imparted to face clutches and couplings by the simultaneous cutting of opposite sides of spaced teeth.

20-315. **Form-Tool Correction Made Easy by a Simple Formula.** Alfred S. Gutman. *American Machinist*, v. 89, July 19, '45, pp. 116-117.
Formula provides immediately the correct angles for form grinding the tool, and it is then a simple matter to calculate tool dimensions. Problem that led up to derivation of the formula given.

20-316. **Practical Ideas.** *American Machinist*, v. 89, July 19, '45, pp. 131-136.
Hat section bends corrected and twists removed by straightener. Boring bar bits held without setscrews. Diamond saw quickly slots binocular prisms. Punch press attachment for spacing holes automatically. Shutter-speed rings chucked by an arbor gripped in a collet. Van stone flanging—die liner reduces replacement expense. Counterbore toolholder for close tolerance work. Parallel and square grinding of pin ends in fixture. Chain-grip pipe vise with toggle tightener. Jig holds sheet metal to angle while riveting. End bushings soldered into drawn steel shells. Short lift hydraulic jack for close quarters. Helical pipe coils wound on mandrel while heated.

20-317. **Universally Adjustable Turning Tools.** Paul Grodzinski. *Industrial Diamond Review*, v. 5, June '45, pp. 126-129.
Designation of tool angles; designation of adjustment angles; main adjustments; real clearance angle, real rake angle; change in cutting angles when tool edge is rotated about horizontal axis in direction of shank; change in cutting angles when tool edge is rotated about a vertical axis; change in cutting angles when tool edge is rotated about horizontal axis perpendicular to shank direction.

20-318. **Wheel Truing Mechanism for Profile Grinder.** E. A. Cooke. *Industrial Diamond Review*, v. 5, June '45, pp. 132-133.
Wheel truing mechanism which is versatile and accurate, and is capable of producing any wheel shape which consists of straight lines or true radii, or of a combination of these. Position of the truing diamond is located by the graticule of a separate microscope on some models, and by the graticule of a built-in microscope on others.

20-319. **Ship Propeller Milling.** *Steel*, v. 117, July 23, '45, pp. 106-109, 141, 144, 146, 148.
Cooperative action between electrical and mechanical devices on unusual milling machine has much significance. Guarantees swift, accurate generation of any contour on ship propellers. 6 ref.

20-320. **Modified Drill Design.** R. W. P. *Machinery* (London), v. 66, June 28, '45, pp. 697-700.
Tool life and production rate increased.

20-321. **Worm Cutting and Milling.** *Machinery* (London), v. 66, June 28, '45, p. 701.
On the lathe it is only a few minutes' work to take a thousandth or two off the sides or to ease the tops of the threads, but on the comparatively inflexible thread miller it is a very different proposition.

20-322. **Universally Adjustable Turning Tools.** Paul Grodzinski. *Industrial Diamond Review*, v. 5, July '45, pp. 149-152.
Combination of angles; radiused and faceted tool edges; back cutting edge.

20-323. **Compound Tools—How to Use Them.** J. A. Grainger. *Sheet Metal Industries*, v. 22, July '45, pp. 1187-1192, 1194.
Tool shown combines all the operations which are performed by the previous tool, plus an operation for plunging a flange around the pierced hole. Thus, the tool becomes a blank, pierce, and plunge tool.

20-324. **Fusion Cutting by High Speed Bandsaw.** R. W. Hancock. *Sheet Metal Industries*, v. 22, July '45, pp. 1205-1210.
Standard woodworking bandsaw is speeded up; intense heat is generated by friction when work is fed into this saw, and in the case of sheet metal it is such that the saw is cutting material which will locally be at melting point, or, more accurately, the saw partly cuts and partly brushes away the semi-molten material. Principal advantage of the process is that fast, effortless cutting is achieved with no appreciable work-drag or distortion. This means that a cut can be made in any direction across a contoured pressing and that no snatching or chattering takes place when cutting a weak or unsupported section.

20-325. **Rodney Calculator for Cam Surfaces.** William D. Rodney. *Screw Machine Engineering*, v. 6, July '45, pp. 58-60.
Convenient device to calculate turret indexing and pullouts in drilling operations.

20-326. **Cincinnati Centerless Grinding Machine.** *Screw Machine Engineering*, v. 6, July '45, pp. 70-78.
Elements of the centerless grinder; principles of centerless grinding; centerless grinding methods.

20-327. **End-Forming Toolholder and Tool.** W. Bruce. *Screw Machine Engineering*, v. 6, July '45, p. 81.
York Arsenals development for Acme-Gridley bar automatics.

20-328. **Radial Rake Angles in Face Milling—3.** J. B. Armitage and A. O. Schmidt. *Mechanical Engineering*, v. 67, Aug. '45, pp. 507-510.
Milling cutters with double radial rake angles. Effect of cutting speed on tool life and chip formation of a combined positive and negative radial rake angle cutter. Results were compared with those of a similar investigation on negative radial rake angle cutters.

20-329. **Ultra-Fine Surfaces on Metals.** Kenneth Rose. *Metals & Alloys*, v. 22, July '45, pp. 70-75.
Practices employed to produce ultra-smooth surfaces on metal parts and tools; grinding, lapping, superfinishing; their engineering applications and the methods of evaluating highly smooth metal surfaces.

20-330. **Machine Tool Magic.** Edwin Laird Cady. *Scientific American*, v. 173, Aug. '45, pp. 79-80, 82.
Machines that make other machines have progressed rapidly during the war, yet the immediate future will demand continuing supplies of new tools. What improved machine tools mean to industry and what may be expected of them in the light of new knowledge.

20-331. **Trimming Parts.** *Steel*, v. 117, July 30, '45, p. 94.
Irregular edges of aircraft components finished by adaptation of standard wood shaper.

20-332. **Modern Machine Tools.** *Aircraft Production*, v. 7, July '45, pp. 340-341.
Assembly presses; molding plastics.

20-333. **Final Operations, II.** G. Schlesinger. *Aircraft Production*, v. 7, July '45, pp. 350-354.
Polishing, buffing and burnishing; chipless forming operations; bearings and spindles.

20-334. **An Investigation of Radial Rake Angles in Face Milling, I.** J. B. Armitage and A. O. Schmidt. *Western Metals*, v. 3, July '45, pp. 11-14, 16.
Effect of negative and positive radial rake angles in milling cutters upon the power required for the cutting action, the tool life of the cutter, the surface finish, and temperature of the work-piece. Tests were conducted with 2½-in. face mills which had two brazed carbide tips.

20-335. **Hints on Multiple Tool Steel Turning with Carbides on Tomorrow's Machines.** Ralph Granzow. *Western Metals*, v. 3, July '45, pp. 36-37.
Basic principles of cutting tool design.

20-336. **Air-Hydraulic Milling Vise Permits Controlled Clamping Pressure.** Conrad Mattson. *American Machinist*, v. 89, Aug. 2, '45, pp. 104-105.
Four castings are used in the vise developed for high-speed carbide milling of steel and aluminum alloy parts. Jaw openings are regulated easily.

20-337. Gear-Driven Straight Edge. *American Machinist,* v. 89, Aug. 2, '45, p. 113.
Made with heavy sections to insure rigidity and when completely assembled weighs between 3200 and 3300 lb. It is 15 ft. long.

20-338. Production Tooling for Standard Machine Tools. E. C. Salisbury. *Production Engineering & Management,* v. 16, Aug. '45, pp. 71-75.
Using ingenious fixtures and unusual cutting tools, Curtiss-Wright specifies standard machines on all operations in its big Buffalo machine shops. Benefits claimed are greater flexibility and the ability to handle "red hot" product design changes in production.

20-339. Grinding Positioned Flats in an Indexing Fixture. *Production Engineering & Management,* v. 16, Aug. '45, p. 76.
Novel method solves grinding problem presented by stud loaded disk.

20-340. Mechanical System Solves Chip Disposal. John T. Smith. *Production Engineering & Management,* v. 16, Aug. '45, pp. 88-91.
Pointing to future trends in plant design, Pontiac's completely mechanical chip and coolant handling equipment reduces manpower requirements, increases over-all plant output.

20-341. Establishing the Corrected Drop on Forming Tools. Charles L. Hall. *Production Engineering & Management,* v. 16, Aug. '45, p. 92.
Formula provides the corrections required for checking or grinding a forming tool when held in a horizontal position.

20-342. Pneumatic Tools Reduce Production Costs. *Production Engineering & Management,* v. 16, Aug. '45, pp. 93-94.
Efficiency, ease of handling because of their light weight and variety of applications all are contributing factors to the greatly expanding use of air operated tools in metal-working.

20-343. Profile Milling. *Steel,* v. 117, Aug. 6, '45, p. 128.
Three consecutive operations on aircraft diffuser part expedite production and reduce to minimum costly hand-finishing operations formerly required.

20-344. Tooling for P-38 Production, II. Howard Campbell. *Modern Machine Shop,* v. 18, Aug. '45, pp. 124-128, 130.
Describes tools and methods used in the building of the Lockheed Lightning P-38.

20-345. High Speed Milling With Carbide Tools. Fred M. Burt. *Modern Machine Shop,* v. 18, Aug. '45, pp. 134, 136, 138, 140, 142, 144, 146, 148, 150.
Few pointers which should be helpful to users of carbide-tipped milling cutters.

20-346. Ideas from Readers. *Modern Machine Shop,* v. 18, Aug. '45, pp. 213-214, 216, 218, 220, 222, 224, 226, 228, 230.
Differential adjusting screw for boring bars. Broaching rectangular taper holes in the shaper. Right angle gage. Multiple height gage.

20-347. The Art of Metal Cutting. Part IX—Carbide Milling of Steel. *Machine Tool Blue Book,* v. 41, Aug. '45, pp. 139-140, 142, 144, 146, 148, 150, 152, 154, 156.
Higher surface foot rates; thicker chips; fewer teeth per cutter; increased power consumption; flywheels when practical; no coolant required; diamond grinding wheels.

20-348. Maximum Results from Borizing. Part 3. C. G. Nordmark. *Machine Tool Blue Book,* v. 41, Aug. '45, pp. 163-164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184.
Shows by actual examples how the versatility of borizing technique enables great accuracy to be achieved.

20-349. Speed and Precision with Hyper Drilling. Karl Stad. *Tool Engineer,* v. 14, July '45, pp. 33-35.
Revolutionary technique portends speeds in mass production drilling far beyond present practices.

20-350. Spiral Grinding of Tools. Franklin J. Blaney. *Tool Engineer,* v. 14, July '45, pp. 47-48.
Thread grinding principles used as a basis.

20-351. Foreign Tool Steel Comparison Chart. *Iron Age,* v. 156, Aug. 2, '45, pp. 48-50.
Identifies foreign tool steels from the trade name.

20-352. Bearing Lands and Negative Rakes Prolong Cutting Tool Life. Mark W. Purser. *American Machinist,* v. 89, Aug. 2, '45, pp. 118-121.
Important progress in solution of wear, chatter and set-up of cutting tools made by lapping slight land just below cutting edge and by stoning a negative rake around this cutting edge.

20-353. Tooling for Compound-Contoured Parts. John Thawley. *American Machinist,* v. 89, Aug. 2, '45, pp. 124-125.
Plaster mock-ups are used in making stretch forms for the mass production of all-metal warplanes. Tool fabrication is sped by standardization.

20-354. Both Sides of Face Clutch Teeth Cut with Single Cutter in One Operation. Ernest Wildhaber. *American Machinist,* v. 89, Aug. 2, '45, pp. 126-128.
Rapid production of overload and sawtooth clutches on gear cutting machines outlined.

20-355. Practical Ideas. *American Machinist,* v. 89, Aug. 2, '45, pp. 129-134.
Brake drums of airplane wheels ground while assembled to hub. Large washers are quickly cut on a burning table. Air cylinder propelled air hammer drives main shaft coupling bolts. Dial indicator on carriage makes micrometer stop gage on lathe. Collet block releases expensive precision machine tools. Adjustable taper gage duplicates dimensions for exact shaft fits. Centering and facing tool for bench lathe production. Gage for small shear eliminates marking of bars. Forming jig holds bar stock in position for welding. Cams replaced on shafts reamed for taper pins. Automatic chuck centers rifle barrels and eliminates dogs. Damaged pneumatic tool cylinders salvaged by honing. Pliers used as drill jig for locating rivet holes. Sandblasting holes avoids expensive die alterations.

20-356. New Ryan Dimpling Process for Hard Aluminum Alloys. *Aero Digest,* v. 50, Aug. 1, '45, p. 121.
Advantages reported for the Ryan process over presently available techniques are the time it saves, lowered costs, and the high quality of dimples and riveting work which result.

20-357. Diamond Dust—A Review of Recent Literature. *Industrial Diamond Review,* v. 5, Aug. '45, pp. 169-171, 181.
Production methods; diamond dies and diamond tipped tools; machining synthetic sapphire and quartz; grinding sintered carbide tools and dies; preparing the laps.

20-358. Diamond Hones—A New Development. F. Whitehead. *Industrial Diamond Review,* v. 5, Aug. '45, pp. 172-174.
Special hones for the simultaneous honing of cylinder sleeves contain six honing sticks each in three self-adjustable jaws. Description of equipment.

20-359. Facilitating Adjustment of Diamond Tools. G. Schlesinger and D. F. Galloway. *Industrial Diamond Review,* v. 5, Aug. '45, pp. 180-181.
Adjustment of faceted diamond tools; rake adjustment; height adjustment.

20-360. Influence of Tool Shape and Cutting Conditions on Surface Quality. S. P. Semenov. *Industrial Diamond Review,* v. 5, Aug. '45, pp. 183-184.
Equipment; influence of cutting speed; influence of rate of feed; influence of depth of cut; influence of point radius of the tool; influence of tool angles.

20-361. One Hundred Million Die Castings. Fred M. Burt. *Tool Engineer,* v. 15, Aug. '45, pp. 18-22.
Outline of tooling and production methods responsible for tremendous war output with maximum quality.

20-362. Power Requirements in Milling. A. O. Schmidt. *Tool Engineer,* v. 15, Aug. '45, pp. 23-26.
Calorimetric tests basis of formula for determining horsepower required in carbide steel milling. 4 ref.

20-363. Cutting Your Costs With the Hack Saw. Frank T. Wruk. *Tool Engineer,* v. 15, Aug. '45, pp. 42-44.
Recent developments in machines, blades and methods make this process economical and speedy.

20-364. Tool Design—With Control. E. A. Cyrol. *Tool Engineer,* v. 15, Aug. '45, p. 48.
Good tool design alone does not bring efficient production. There must also be tool control.

20-365. Economical Jigs and Fixtures for Short Run Production. Alex S. Arnott. *Tool & Die Journal,* v. 11, Aug. '45, pp. 104-107.
Turning fixture; milling fixture; first operation drill jig; second operation drill jig.

20-366. Measurements of Temperatures in Metal Cutting. A. O. Schmidt, O. W. Boston, and W. W. Gilbert. *Tool & Die Journal,* v. 11, Aug. '45, pp. 115-116, 118, 120.
Chip temperature is uniform at high cutting speeds when other conditions are constant. Temperature of the tool increases with the cutting speed, and the amount of metal removed before tool failure is inversely proportional to the cutting speed. 6 ref.

20-367. Diamonds as Tools Speed up Victory. *Domestic Commerce,* v. 33, Aug. '45, pp. 28-29.
An industry must; three types of diamonds; world production down; large use in drills; base-metal use; production costs reduced; varied uses; diamond dies.

20-368. Out-of-the-Ordinary Internal Grinding Set-Ups. Carl G. Nordmark. *Machinery,* v. 51, Aug. '45, pp. 152-156.
Some of the set-ups illustrated solve difficult grinding problems; others are designed to secure faster or more accurate production.

20-369. Recommendations for High Speed Carbide Milling. *Western Machinery and Steel World,* v. 36, July '45, pp. 306-307, 324, 327.
Recommendations based on research and experience in actual shop production; general rules for choice of speed.

20-370. Machining Gun-Mounting Bases on Horizontal Boring Machines. G. I. D. *Machinery* (London), v. 67, July 12, '45, pp. 29-34.
Advantages of horizontal borers; adapting the machines; first operation; special milling cutter.

20-371. The Unification of Screw Threads. *Machinery* (London), v. 67, July 12, '45, pp. 48-50.
Thread grinding and thread rolling; tolerances for tropical finish; desirability of a 60° thread.

20-372. Face Milling. *Automobile Engineer,* v. 35, July '45, pp. 287-288.
Tests with cemented carbide tools of different radial rake angles.

20-373. Negative Rake Turning Tools Improve Roughing Cuts in Steel. Carroll Edgar. *American Machinist,* v. 89, Aug. 16, '45, pp. 99-101.
Carbide-tipped turning tools having negative side and back rake provide longer tool life between grinds. Negative rake finishing, facing and boring.

20. MACHINING *(cont.)*

20-374. **Gear "Rolling".** G. W. Birdsall. Steel, v. 117, Aug. 20, '45, pp. 126-127, 164, 166.
Fast method of checking in gear production becomes increasingly useful with the development of ingenious fixtures.

20-375. **Practical Ideas.** *American Machinist*, v. 89, Aug. 16, '45, pp. 127-132.
Armature pivots polished without removing from the armature. Simple welding operation stops leakage from oil pans. Fishtail mill machines alloy bronze castings quickly. Wheel dressing attachment for external thread grinder. Precision toolholder for turning inside and outside curves. Brass-faced removable liners clamp to vise jaws. Sliding plate gage checks punch nose profile. Micrometer indicator measures counterbore or countersink depth. Light-metal shield directs fumes away from welder. Automatic clamping for quick loading and unloading chuck. Grooves in grinding wheel rim increase active life. Overload safety device for whirler cranes.

21. LUBRICATION AND FRICTION; BEARINGS

21-62. **Causes of Failure in Heavy-Duty Bearings.** L. M. Tichvinsky. *Machine Design*, v. 17, July '45, pp. 115-116, 176.
Discusses types of failures most often encountered in the critically loaded bearings of a diesel, and indicates some preventive measures which, it is hoped, will aid designers in providing maximum bearing life in other types of machines.

21-63. **Relining Lead Alloy Journal Bearings.** E. A. Wolfenden. *Metals & Alloys* v. 22, July '45, pp. 81-84.
Describes best practices in fluxing, tinning, pouring and cooling the lining metal and other operations to produce the highest possible bond strength between bearing metal and backing in the relining operation.

21-64. **Lubricants in Diamond - Crown Cutting Fluids.** *Industrial Diamond Review*, v. 5, July '45, p. 161.
Tests to determine the effect of lubricating agents in a diamond-drilling bit coolant and cuttings-removal liquid on the drilling speed and bit wear; tests carried out by U. S. Bureau of Mines. Results given in Reports of Investigations 3793.

21-65. **Testing Cutting Oils.** *National Petroleum News*, v. 37, Aug. 1, '45, pp. R614-R616,, R-618, R620, R622.
New procedure of evaluating this specialty product has enabled a large reduction to be made in number of grades manufactured.

21-66. **Carrying Capacity of Bearing Liners of Sintered Iron.** E. Heidebroek. V.D.I. *Zeitschrift*, v. 88, no. 15 and 16, 1944, pp. 205-207. *Engineers' Digest* (American Edition), v. 2, July '45, pp. 321-322.
Sintered iron a favorite metal for bearing liners because of its porosity which makes possible the retention of a certain amount of oil in its innumerable pores by capillary force. Test results show clearly that the field of successful application lies within the range of low speeds with an upper limit of 5 m. per sec. at most. Sintered iron bearings characterized by the fact that such bearings are capable of highly successful long time operation with a low coefficient of friction and without any external oil supply.

21-67. **Investigation of the Isothermal Viscosity of Bearing Alloys.** J. de Lacombe and M. Dannenmuller. *Revue de Metallurgie*, v. 41, no. 3, 1944, pp. 71-82. *Engineers' Digest* (American Edition), v. 2, July '45, pp. 349-352.
Plastic flow of bearing alloys in compression, with particular attention to the time factor. Machine employed for carrying out the tests is of a special design based upon experiences made in the creep testing of steels at high temperatures. Description of machine and results of tests on lead-base alloys, lead-tin-base alloys, cadmium-base alloys, zinc-base alloys, copper-base alloys, magnesium and aluminum-base alloys.

22. JOINING

Welding; Brazing; Flame Cutting; Riveting

22-407. **Lightweight Indexing Fixture for Automatic Riveting.** G. F. Gerhauser. *Tool Engineer*, v. 14, June '45, pp. 44-45.
Standardized fixtures broaden work range of automatic, single purpose production machines.

22-408. **Fundamental Data on Oxy-Acetylene Cutting Technique.** G. V. Slottman. *American Machinist*, v. 89, July 19, '45, pp. 99-101.
Practical applications of flame cutting have led to refinements which embrace preheating of the metal and improvements in the design of torch tips. Reviews developments in flame cutting.

22-409. **Oxy-Acetylene Welding of Steel Plate.** *Industry & Welding*, v. 18, July '45, pp. 30-32.
Preparation of metal and torch application in the fusion of mild carbon plate welds.

22-410. **Furnace Brazing.** H. G. Telford. *Industry & Welding*, v. 18, July '45, pp. 34-36.
Design of the article to be fabricated. Suitable alloy, furnace, plant facilities, all are prime factors in plotting the potential profit and volume of production by use of the furnace brazing process.

22-411. **Proper Resistance Welding Set-Ups for Ferrous and Non-Ferrous Metals, II.** F. R. Woodward. *Industry & Welding*, v. 18, July '45, pp. 63-66.
Following an analysis of the physical characteristics of the materials to be joined by resistance welding, consideration may be given to "weld time," pressures and other factors governing the quality of the weld.

22-412. **Cost of Refacing Worn Car Wheel Flanges Reduced by 50%.** Fred Strawbridge. *Industry & Welding*, v. 18, July '45, pp. 96, 98-99.
Simple, layer-on-layer arc welding process accounts for a 50% saving in the cost of refacing abrasion-worn flanges of car wheels.

22-413. **Welding the Weasel.** Clyde B. Clason. *Welding Engineer*, v. 30, July '45, pp. 40-43.
The Weasel is all-welded, and all welding processes are required for its manufacture.

22-414. **Resistance Welding With Storage-Battery Power.** G. W. Birdsall. *Steel*, v. 117, July 23, '45, pp. 112-113, 158, 160, 162, 164.
Use of special storage batteries and direct control of large welding currents are expected to expand greatly field of spot, seam, flash, butt and upset or "forge" welding, for these advances no longer limit welding currents to those available from the power system serving the plant.

22-415. **Fabrication as a Substitute.** H. G. W. *Machinery* (London), v. 66, June 21, '45, pp. 683-685.
Welding and casting methods compared; the correct approach; typical examples; welded jigs; power presses; stress relieving.

22-416. **Welding Manganese Castings in Special Trackwork.** *Railway Engineering and Maintenance*, v. 41, Aug. '45, pp. 781-783.
In 1942 and 1943 a number of manganese test frogs were repaired by arc welding using various methods and materials, and were later supplemented by a series of laboratory studies. Presents a background of these tests and a series of tentative conclusions based on them.

22-417. **The Technical Control of Resistance Welding.** H. E. Lardge. *Sheet Metal Industries*, v. 22, July '45, pp. 1241-1246.
How control of welding can be achieved through a welding technical department.

22-418. **The Welding of Non-Ferrous Metals. Part V.** E. G. West. *Sheet Metal Industries*, v. 22, July '45, pp. 1247-1252, 1256.
Manipulation; carbon-arc welding; atomic hydrogen welding; argon-arc welding; heliarc welding; the Weibel & Rakos processes; protection of operators. 7 ref.

22-419. **Shaped Guides Increase Accuracy in Manual Torch Operations.** G. V. Slottman. *American Machinist*, v. 89, Aug. 2, '45, pp. 114-117.
Knowledge of cutting drag is important in hand operations. Pointers on hand flame cutting.

22-420. **Aids to Riveting.** *Aircraft Production*, v. 7, July '45, pp. 321-322.
Consolidated Vultee equipment; reaction riveting; rivet dispenser; rivet extraction.

22-421. **1945 Specifications for Metallic Arc Welding Electrodes.** Orville T. Barnett. *Steel*, v. 117, Aug. 6, '45, pp. 112-115.
Specification for mild steel and low alloy electrodes permits consumers to make rigid and complete demands on manufacturers. Guide to classification and reiteration of rule specifying single assignment of grade numbers are worthwhile additions to data.

22-422. **Boost Boiler Welding Speed.** George Bain. *Industry and Power*, v. 49, Aug. '45, p. 76.
Modern process of automatic welding permits higher welding speeds and increased production per manhour of welding.

22-423. **Induction Brazing and Soldering.** H. U. Hjermstad. *Iron Age*, v. 156, Aug. 9, '45, pp. 56-60.
High frequency induction heating can be fully controlled to carry out low temperature brazing and soldering without damage to surfaces or components within containers. Permits salvaging of cutting tools with minimum effects on hardness.

22-424. **Gas Cutting of Stainless Aided by Fluxing System.** *Iron Age*, v. 156, Aug. 9, '45, p. 61.
Stainless steel cut by oxy-acetylene torch as result of development of a flux-injection process.

22-425. **Welding Electrode Standards.** J. F. Lincoln. *Machine Tool Blue Book*, v. 41, Aug. '45, pp. 187-188.
Cites need for simple, easily understandable standards which would enable a manufacturer to manufacture to such standards consistently, and would enable purchaser to test readily and easily electrodes if he wished to do so, to see if manufacturer was conforming to standards.

22-426. **Welding as an Aid in the Fabrication of Ordnance Material.** Scott B. Ritchie. *Welding Journal*, v. 24, July '45, pp. 629-634.
In development and manufacturing arms and equipment, welding has played a major role. It is one of the fundamental processes. Exhaustive research has been conducted and rapid commercial development has been accomplished within a comparatively short period.

22-427. **Design and Febrication of an All-Welded Pressure Scalder.** W. J. Conley. *Welding Journal*, v. 24, July '45, pp. 635-638.
Illustrates the versatile and practical use of arc welding for economical fabrication.

22-428. **Safety Control for Arc Welders Eliminates Shock.** Herbert Mahumed. *Welding Journal*, v. 24, July '45, pp. 638-639.
With the introduction of a.c. transformer welders in its shops, the safety angle thoroughly investigated.

22-429. **Welding Structures of Hastelloy Alloys.** J. A. Gallagher. *Welding Journal*, v. 24, July '45, pp. 641-650.
Resistant to many chemicals; variety of forms available; fabricated by welding; use of atomic hydrogen arc; metallic arc process; oxy-acetylene welding; liners first plug welded; strip welding developed; test procedures point way to improved techniques; anneals maintain corrosion resistance.

22-430. **The Restriction of E6012 Electrodes.** Omer Blodgett. *Welding Journal*, v. 24, July '45, pp. 651-657.
E6012 electrode has certain advantages which put it in a class by itself. Because of its particular type of coating it has a high deposition rate, and it is ideal for poor fit-up joints in that it does not undercut easily. It can handle high currents without excessive spatter. This electrode produces a convex weld thus insuring a full size weld. It is also ideal for multipass fillet welds in that the passes do not run down as do the so-caled hot rods, but rather hold their shape.

22-431. **Templet Tips.** Rudolph Chelborg. *Welding Journal*, v. 24, July '45, pp. 657-659.
Tips, suggested by operators who have used the ideas in making and using templets for oxy-acetylene machine cutting of shapes involving sharp corners or other peculiarities. These ideas should suggest solutions for similar problems faced by other operators.

22-432. **Investigation of the Final Rinsing Operation in the Chemical Surface Preparation of Alclad 24S-T for Spot Welding.** R. A. Wyant, D. J. Ashcraft and T. B. Cameron. *Welding Journal*, v. 24, July '45, pp. 361s-369s.
Series of experiments to determine the effects of time, temperature and composition of water in rinsing Alclad 24S-T sheet following its surface preparation for spot welding. Results show that a reaction sometimes occurs between the surface of the metal and the final rinse water. Effect of the reaction is to raise the contact resistance of the sheet. **6 ref.**

22-433. **Fabrication of Large Electrical Machines.** Peter Conway. *Steel Processing*, v. 31, July '45, pp. 427-429.
Specifications for the steel stock depend on the end product and the operations required during fabrication. It presents a problem in welding which can be solved only by use of a very ductile welding rod or by welding the parts while hot.

22-434. **Automatic Welding Aids Construction of Pressure Vessels.** *Steel Processing*, v. 31, July '45, pp. 455-456.
Automatic arc welding employed for joining metals exemplified in the construction of huge tanks for pressure and storage purposes.

22-435. **Furnace Brazing With Aluminum Brazing Sheet.** *Industrial Heating*, v. 12, July '45, pp. 1140, 1142, 1144, 1146, 1148, 1158.
Consists of an aluminum alloy core with a brazing alloy coating, on one or both sides, metallurgically bonded to the core. When heated above the melting point of the coating alloy and below the melting point of the core, in the presence of an appropriate flux, a portion of the coating will melt and flow into the nearest capillary spaces.

22-436. **The Relation Between the Hydrogen Content of Weld Metal and Its Oxygen Content.** L. Reeve. Iron & Steel Institute, Advance Copy, June '45, 12 pp.
Study of the welding of high tensile steel indicates that cracking may occur in the hardened zones of the base plate immediately adjacent to the weld. Determines the relationship between the FeO content of weld metal and its total and diffusible hydrogen content. Total hydrogen content is slightly reduced, while the diffusible hydrogen content is considerably reduced, when the FeO content in the weld is increased. 18 ref.

22-437. **Application of Quality Control to Resistance Welding.** L. S. Hobson, R. S. Inglis and R. P. McCants. *Electrical Engineering*, v. 64, Aug. '45, pp. 573-575.
System of quality control of resistance welding. Standard samples of material identical with production parts are periodically inserted in the welding machine and welded without disturbing the settings and then tested to destruction in a torsion device. The diameter, torque, and angle of twist at failure all are measured and combined into a single number indicative of weld quality. This number is plotted on control charts, and corrective action is taken whenever the control limits are exceeded. By setting these limits well within allowable values the quality of production parts is assured.

22-438. **Designing of "Trouble-Free" Dies, Part I.** C. W. Hinman. *Modern Industrial Press*, v. 7, July '45, pp. 22, 40.
Recent improvements in modern welding equipment. Portable motorized battery cart with a welding gun installation. A welding shop on wheels; scissors types of spot-welding guns; utility spot-welding.

22-439. **Welded 18-8 Steel.** Wilson G. Hubbell. *Iron & Steel*, v. 18, July '45, pp. 230-234.
Effect of stabilizing and stress relief heat treatment.

22-440. **Flash-Butt Welded Joints, Their Design and Properties—Part I.** J. J. Riley. *Product Engineering*, v. 16, Aug. '45, pp. 511-514.
Basic principles in designing flash-butt welded joints discussed and illustrated as they apply both to parts in which design stresses are critical and for which optimum welding procedures have been developed, and to parts in which deviation from standard practice is possible.

22-441. **Strength of Brazed Joints as Affected by Fit and Finish.** W. H. Jones and B. W. Buist. *Product Engineering*, v. 16, Aug. '45, pp. 530-531.
Strength of furnace brazed joints and flow of copper in the joints are shown to be affected by surface finish and fit of the joint, which should be specified in design of parts to be joined by copper brazing.

22-442. **Do You Send Your Equipment to the Cleaner Regularly?** *Industry & Welding*, v. 18, Aug. '45, pp. 38-39, 88-89.
Use of filters wherever possible: set up a system to keep your welding equipment working at its highest efficincy.

22-443. **Oxy-Acetylene Welding Architectural Exteriors for Enamel Finishing.** *Industry & Welding*, v. 18, Aug. '45, pp. 58-59.
Competing against glass, tile and bright metal combinations, welded light gage metal can be shaped and enameled at lower cost. Offers startling and attractive effects. Elaborate equipment for welding not necessary.

22-444. **Operation Pluto.** J. M. Sinclair. *Welding*, v. 13, July '45, pp. 236-241.
Construction of the Hamel pipeline, used in "Pluto," is one of the outstanding British engineering feats of the war. 198,000 flash-butt welds were made in a total length of pipe of 970 miles. Welding program of 12 miles a day was maintained until the work was completed.

22-445. **Welded Machinery Parts.** Edward J. Charlton. *Welding*, v. 13, July '45, pp. 253-262.
Latest developments in the welded design of machine components and gives many examples to prove the advantages of the latest methods of fabrication.

22-446. **Binding Agents for Flux Coatings.** W. Andrews. *Welding*, v. 13, July '45, pp. 263-268.
Recent developments in the application of alternative inorganic binding agents for the flux coatings of metallic arc electrodes and welding rods. Alkaline silicates; drying of silicates; effect of moisture in electrode fluxes; welding of aluminum; use of sodium aluminates; fluorides; mixing operation; mixing equipment; control of water addition; exclusion of reactive flux constituents.

22-447. **New Oil-Field Engine.** *Welding*, v. 13, July '45, pp. 269-270.
Benefits made possible through change-over to welded design. All-welded petrol engine for oil field service which replaced the previous type engine of heavy cast iron construction.

22-448. **Welding Supercharger Turbine Wheels.** G. W. Birdsall. *Steel*, v. 117, Aug. 13, '45, pp. 104-106, 142, 144, 146, 148, 151.
Submerged arc welding, well known for its wide use in fabrication of welded steel ships, exhibits its versatility by meeting the extremely rigid specifications involved in joining cast Vitallium turbine buckets to a stainless steel disk to form the turbine wheel for aircraft turbosuperchargers.

22-449. **Method Is Developed for Flame Cutting Stainless Steel.** *Steel*, v. 117, Aug. 13, '45, pp. 107, 152.
Unit consists of a cylindrical container from which the flux is fed into the lines in predetermined amounts by a motor-driven screw feed mechanism. Container has a capacity of 35 lb. of flux. Modified hand torch was built to provide necessary flux control.

22-450. **Heliarc Welding at Northrop.** F. Masdeo. *Welding Engineer*, v. 30, Aug. '45, pp. 35-39.
Successful arc welding of magnesium alloys makes it possible to revolutionize aircraft design. Full details of this development after several years' trial.

22-451. **Welding in a Cement Mill.** T. B. Jefferson. *Welding Engineer*, v. 30, Aug. '45, pp. 44-46.
Welding arcs and sparks are a familiar sight around a cement mill. Long ago the cement mill operator learned of the 100 important uses to which welding may be put.

22-452. **Semi-Automatic Welding.** John Lippart. *Welding Engineer*, v. 30, Aug. '45, p. 47.
Ingenuity in the design of special handling facilities made it possible to use automatic welding machines on large parts of irregular shapes.

22-453. **Fabricating Locomotive Parts.** *Welding Engineer*, v. 30, Aug. '45, pp. 48-50, 77.
Welded locomotives, trucks and platforms have proved themselves to be strong without excess weight. They are easily fabricated by cutting and welding readily available rolled steel plates and structural shapes.

22-454. **Welded Safety Guards.** *Welding Engineer*, v. 30, Aug. '45, p. 50.
To test the electrical connections of bomber turrets, it was necessary to devise a "third-rail" power supply. Welding made possible an ingenious, flexible system.

22-455. **Welding Heavy Armor Decks.** J. S. Wright. *Welding Engineer*, v. 30, Aug. '45, p. 52.
Warpage proved a tough problem in the butt welding of 1½-in. deck plates on warships. It was finally overcome by using jack-clamps before welding.

22-456. **Spot Welding Aids Maintenance.** Lee Brady. *Welding Engineer*, v. 30, Aug. '45, p. 54.
Example in the use of spot welding by small shops for purely maintenance purposes.

22-457. **Maintenance on the Home Front.** *Welding Engineer*, v. 30, Aug. '45, p. 60.
Boilers, oil tanks and tar kettles are some of the necessities for the home front which a St. Louis jobber is keeping in service by welding.

22-458. **Flash Welding Alloy Steel Rings.** P. B. Scharf. *Iron Age*, v. 156, Aug. 16, '45, pp. 50-53.
Flash welding methods used satisfactorily in the production of mild steel rings applied to alloy steel.

22-459. **Brazing of Heat Treated Parts.** *Iron Age*, v. 156, Aug. 16, '45, pp. 54-55.
Shear test on integral component shows that silver brazing is a satisfactory method for joining heat treated parts and meets definite tensile strength requirements.

22-460. **Determining Surface Resistance of Aluminum for Welding.** *Iron Age*, v. 156, Aug. 16, '45, p. 74.
Kelvin double-bridge device improves control over the cleaning and deoxidation of the aluminum stock.

22-461. **Oxy-Acetylene Machines Meet Varied Cutting Requirements.** G. V. Slottman. *American Machinist*, v. 89, Aug. 16, '45, pp. 106-110.
Different machines and auxiliary equipment reviewed.

22-462. **Automatic Welding Applied to Large and Small Lots.** *American Machinist*, v. 89, Aug. 16, '45, pp. 122-123.
Experience of two manufacturers proves the process versatile if positioners and fixtures are designed for maximum flexibility.

23. INDUSTRIAL USES AND APPLICATIONS

23-183. **Naval Ordnance Plant Builds 5-In. Guns.** *American Machinist*, v. 89, July 19, '45, pp. 122-127.
Westinghouse-operated war-built plant holds limits of ten thousandths of an inch on gun assemblies weighing many tons.

23-184. **NE Steels for Steering Knuckles and Axle Drive Shafts.** J. H. Clark, J. D. Walker and A. S. Jameson. *Metal Progress*, v. 48, Aug. '45, pp. 280-287.
Object of test procedures was to obtain step-by-step information which would allow use of new steels, economical in alloys, during emergency when alloying metals were scarce, and at same time produce parts which would be capable of satisfactory performance under normal service conditions. From field reports there has been no reason to suppose that where the NE steels have been used they have not given service comparable with original steels they replaced.

23-185. **Coil-Shank Bolts and Nuts.** *Engineering*, v. 159, June 29, '45, p. 516.
Combination of the properties of a helical spring in tension with the compressive properties of the ordinary screwed nut; it is not intended to replace the ordinary solid bolt in situations where heavy loading is desired, but is designed for securing accessory attachments, light structures, mechanisms requiring shock-absorbing properties.

23-186. **Four Types of German Aircraft Engine Radiators.** M. W. Bourdon. *Automotive Industries*, v. 93, July 15, '45, pp. 32-34, 110, 112, 114.
Report issued by the British Ministry of Aircraft Production dealing with design, construction and materials of four types of radiator removed from German aircraft.

23-187. **Light Alloys in Photocells, Rectifiers and Condensers.** *Light Metals*, v. 8, July '45, pp. 348-359.
Properties of interleaving papers are critical, and, physically and chemically, are related to the electrode metals.

23-188. **Light Alloy Bicycles.** *Light Metals*, v. 8, July '45, pp. 360-362.
Early history of the aluminum alloy bicycle, together with a discussion on the theory and practice of more recently developed models.

23-189. **Enameled Steel Segments.** *Steel*, v. 117, July 23, '45, p. 120.
Developed from airport markets and commercial signs.

23-190. **Aluminum Foil on Postwar Production Lines.** *Modern Packaging*, v. 18, July, '45, pp. 100-102, 174, 176.
Foil-wax-paper laminations; sterilized bandage wrap; foil tight wraps; gravure printed foil in rolls; foil laminations for unit packs; plain foil uses; cathodic protection with foil; foil for butter wrappers.

23-191. **Production of Light Weight Blast Furnace Slag.** H. O. Wicks. *Iron & Steel Engineer*, v. 22, July '45, pp. 71-76.
Using a continuous machine process of dry granulation which offers control of moisture content and of cell structure, blast furnace slag is converted into a semi-granular cellular material having great possibilities in the building field.

23-192. **Ball Bearing Versatility.** H. F. Williams. *Machine Tool Blue Book*, v. 41, Aug. '45, pp. 199-200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222.
Interesting and novel uses of these "Jewels of Industry."

23-193. **New Uses of Aluminum Will Aid Postwar World.** *Western Metals*, v. 3, July '45, pp. 20-21.
Uses in transportation, farm or city building; helping spin nylons and ready-mixed paints.

23-194. **Wire Gold Braid and Military Insignia.** R. Levi. *Wire & Wire Products*, v. 20, Aug. '45, pp. 559-562.
Describes development of new industry and different manufacturing processes.

23-195. **High Strength Steels for Light Weight Structures.** Frederick D. Foote. *Metals & Alloys*, v. 22, July '45, pp. 92-99.
Low alloy high strength steels containing enough "alloy" to provide superior yield strength and corrosion resistance as compared to structural carbon steels are expected to play a prominent part in the design and construction of light weight transportation equipment to be built and used in the postwar period. Discusses these steels from the engineering point of view with special attention to their mechanical properties, corrosion resistance and general suitability for light weight design.

23-196. **Aluminum in the Chemical Industry.** J. L. Bray. *Aluminum & Magnesium*, v. 1, July '45, pp. 14-17, 25, 28-29.
Aluminum and its alloys have found wide application in the manufacture and handling of textiles, paper, rubber, petroleum, paint, organic and inorganic chemicals, food, soap and explosives. Characteristics which make aluminum such a useful metal to these industries are: Chemical stability; high heat conductivity; ease of fabrication; light weight; available form.

23-197. **"Tool Steel Tubing" Used in Construction of Dies for Manufacture of Practice Mines.** Sanford Markey. *Modern Industrial Press*, v. 7, July '45, pp. 28, 30.
Advantages multiplied to the point where the material can be best used in three main divisions. These are: Cutting, blanking and forming tools; sleeves, bushings, collets, reciprocating parts; machine parts, such as bearings and rolls.

23-198. **The A.I.R.O.H. House.** *Metal Industry*, v. 67, July 20, '45, pp. 38-39.
Constructional details, assembly methods and internal fittings of aluminum houses.

23-199. **Aluminum Alloy Pistons.** *Metal Industry*, v. 67, July 20, '45, p. 41.
Importance of metallurgical control in fabrication; wrought and cast pistons.

23-200. **Mir-O-Col Alloy Development.** Robert E. Turman and W. Wesley Mills. *Western Machinery & Steel World*, v. 36, July '45, pp. 308-310.
New uses for Ni-Resist and hard-facing metals in post-war era create demand for enlarged facilities.

23-201. **Methods of Manufacturing Magnesium Spoilers.** *Western Machinery & Steel World*, v. 36, July '45, pp. 318-319, 321.
Embraces the design, fabrication and heliarc welding of the magnesium spoiler used in the Black Widow P-61 night fighter.

23-202. **Making Torsion-Bar Springs.** Charles O. Herb. *Machinery*, v. 51, Aug. '45, pp. 141-149.
Springs in the form of straight bars have proved advantageous on military vehicles and may find postwar applications. Describes the procedure of the Spencer Mfg. Co.

23-203. **Manufacture of Consumer Gas Ranges.** Fred Doering. *Steel Processing*, v. 31, July '45, pp. 434-437.
Cooking range development, manufacture, promotion and sale has graduated and matured. Increasingly important is the total research required to provide the customer with a scientifically designed precision cooking instrument.

23-204. **Applications and Advantages of Constructional Alloy Steels.** *Steel Processing*, v. 31, July '45, pp. 442-445.
Selection and application of a steel depends upon formability, machinability, welding properties, size of section, hardenability, creep strength, toughness, resistance to wear, fatigue strength, and low temperature performance. Steels enumerated for use in gears and shafts, springs, oil industry equipment, and aircraft.

23-205. **A Roof That Floats on Air.** *Sheet Metal Worker*, v. 36, July '45, pp. 41-42.
Plans proposed for a stadium having a 900-ft. diameter aluminum roof which is blown up like a ballon and supported with ventilating fans.

23-206. **War Alloy Steels Shoot the Works.** D. B. Stough, *Stove Builder*, v. 10, Aug. '45, pp. 25-28, 74, 76.
Plant expansion needed; increase in alloy steels; prewar and war uses; alloying elements; war peak passed; stainless steels; use in industrial fields.

23-207. **Aluminum Lightning Rods.** *Modern Metals*, v. 1, Aug. '45, p. 7.
A 12-in. aluminum air terminal complete with roof saddle or support. The saddle is attached to the pure aluminum lightning rod; early history; fabrication now easier; aluminum vs. copper; lightning.

23-208. **Laminated Aluminum Solves Protection Problems.** John M. Cowan. *Modern Metals*, v. 1, Aug. '45, p. 13.
Outline of a new material which protects heavier materials and supplies better than will aluminum foil. This laminated foil and cotton material probably has a future for packing radios, typewriters and heavier materials to be shipped to distant markets.

23-209. **Aluminum Bridges—A Gateway to Further Structural Applications.** *Modern Metals*, v. 1, Aug. '45, pp. 18-19.
Versatility of the battle-tested metal—aluminum—gives promise to many new applications for this metal, visualizes a virtual boom for aluminum in such applications as boats, river barges, elevators, refrigerated automobiles, boxcars and many others.

23-210. **Plumbing Fixtures.** W. C. Nichols and Joseph Palma, Jr. *Die Casting*, v. 3, Aug. 45, pp. 26-27, 58.
Projected designs for plumbing fixtures are presented, based on the use of zinc and brass alloys.

23-211. **Die Casting in Canada.** *Die Casting*, v. 3, Aug. '5, pp. 28, 30-33.
Extensive application of die castings in Canada's war production program similar to this country. However, there have been some ordnance designs shown which are quite different from American practice.

23-212. **Precision Instrument Assemblies.** Ralph Bazley. *Die Casting*, v. 3, Aug. '45, pp. 34, 36-38.
Investment required for dies can be fully justified in die castings by the accrued savings in machining, through dimensional uniformity, which simplifies or eliminates subsequent tooling.

23-213. **Case Studies of Die Casting Applications.** *Die Casting*, v. 3, Aug. '45, pp. 52-56.
Illustrates, by concrete examples, why experienced designers chose die castings for certain products.

23-214. **Improved Techniques Produce Superior Stainless Clad Steel.** L. W. Townsend. *Steel*, v. 117, Aug. 20, '45, pp. 145, 148, 150.
Postwar opportunities for use of stainless clad metal may increase in proportion to growing importance of cladding. Applications range from heavy stainless clad for chemical equipment to sheets as thin as 0.025 in. gage.

24. DESIGN

24-63. **Design Tips for Plastic Coating for Corrosion Resistance.** Kenneth Tator. *Corrosion & Material Protection*, v. 2, June '45, pp. 14-17.
Modifications in design offered as suggestions. Basic principles: Liquids retract from sharp edges or burrs; liquids accumulate in corners or acute angles; liquids will not flow up-hill.

24-64. **Production Processes — Their Influence on Design, I.** Roger W. Bolz. *Machine Design*, v. 17, July '45, pp. 109-114.
Broaching.

A.S.M. Review of Current Metal Literature—*Continued*

24. DESIGN (*Cont.*)

24-65. **Working Stresses for Helical Springs.** A. M. Wahl. *Machine Design,* v. 17, July '45, pp. 129-134.

Dissusses some of the fundamental principles underlying the choice of working stresses in springs. Reasons for the wide variation in working stress used in practical design. Emphasis given to the significance of the various stresses calculated by methods in common use. Utilization of these fundamental principles in practical design illustrated by reference to actual designs of springs used in industrial and railway work. Limited to steel round-wire springs and to cases where normal temperatures and no corrosion are involved. Values of working stresses used by the Ordnance Department and by spring manufacturers given.

24-66. **Strength of Magnesium Alloy Columns.** F. A. Rappleyea. *Journal of the Aeronautical Sciences,* v. 12, July '45, pp. 339-344.

To present data for designing magnesium alloy columns, tests on round bars of various commercial magnesium alloys were made. Two sets of end conditions were used—pin-ended and flat-ended. The pin-ended tests were conducted using carefully machined semi-spheric ends, a modified version of a jig proposed by J. A. Van den Brock. The flat-ended tests were made between two closely ground platens. Various types of formulas were studied for applicability to design use. 9 ref.

24-67. **An Analytical Method of Cam Design.** W. B. Carver and B. E. Quinn. *Mechanical Engineering,* v. 67, Aug. '45, pp. 523-526.

Analytical method yields four items of information that are of value in designing a disk cam with a flat-faced radial follower: Minimum radius of the cam can easily be found; minimum length of follower face can be determined; location of the point of contact can be found; parametric equations of the cam contour can be determined.

24-68. **Structural Discontinuities Modify Stress Distribution.** B. C. Boulton. *Product Engineering,* v. 16, Aug. '45, pp. 505-510.

Analysis of conditions that produce local stress concentrations and the effect of structural irregularities and discontinuities on the distribution of stress in critical sections. Effect of notches in reducing the maximum strain obtainable before failure. Strain sensitivity of a material to notches as related to the shape of the stress-strain curve.

24-69. **Analysis of Gear Tooth Contact by Line of Action Drawings.** Fred Bohle. *Product Engineering,* v. 16, Aug. '45, pp. 532-536.

Line of action drawings based on actual machine processes and tools used in cutting gears show the true tooth shapes, width of flat at top of teeth, fillets, undercut, length of line of action, base pitch and presence of interference. Methods for improving strength and accuracy are discussed.

24-70. **Torsion Bar Suspension, Developed by Buick, Is Major Feature of Famous Hellcat.** *Steel Processing,* v. 31, July '45, pp. 430-433.

Effectiveness of suspension; suspension in operation; importance in tank design; production of torsion bars; sequence of manufacture; operation—equipment.

24-71. **Forging Die Design.** John Mueller. *Steel Processing,* v. 31, July '45, pp. 438-439, 454.

Of importance in forging design is the avoidance of thin sectioned forgings. Flat, thin sectioned forgings are undesirable, because of the excessive hammer blows required to pound the forging down to size, and because of the excessive strain and wear on the hammer dies. Transition from thin to thick should be as gradual as possible, avoiding all abrupt sectional changes.

24-72. **Design and Operation of Modern Progressive Dies.** C. W. Hinman. *Steel Processing,* v. 31, July '45, pp. 446-448.

Series of die operations grouped at each of several consecutive stations. Each operation is cut into a strip of metal which is passed over the dies and under the punches. In the last station of the die, the work is cut from the strip and drops through the die, or is blown by compressed air from the surface of the die. Progressive dies generally complete the work piece at the last station.

24-73. **What Physical Tests on Die Casting Means to Designers.** *Die Casting,* v. 3, Aug. '45, pp. 22-24, 45, 46.

Summary of the physical properties of the principal die casting alloys; data compiled for the product designer as an aid in the selection of the proper alloy for meeting service requirements.

24-74. **Interchangeability.** C. A. Gladman. *Automobile Engineer,* v. 35, July '45, pp. 267-270.

Basic principles underlying the application of tolerances.

24-75. **Improving Design Trough Life Testing.** R. E. Peterson. *Machine Design,* v. 17, Aug. '45, pp. 127-130.

Life testing, field tests, laboratory tests of conventional specimens, stress analysis, and studies of mechanics of materials all have a proper place in the overall picture, and if we wish to make the most effective progress in basic design practice we should plan our work so that the results obtained in these fields can be correlated in a fundamental manner.

25. MISCELLANEOUS

25-84. **Adjustable Tube-Marking Fixture.** Alex S. Arnott. *Tool & Die Journal,* v. 11, July '45, pp. 104-108.

Fixture to perform the marking operation is illustrated.

25-85. **Automatic and Non-Automatic Machines Meet Varied Marking Requirements.** H. O. Bates. *American Machinist,* v. 89, July 19, '45, pp. 128-130.

Cylindrical, conical and odd-shaped parts require special marking devices and fixtures to meet mass production needs. These developments and other marking mthods are reviewed.

25-86. **Model War Plant.** *Steel,* v. 117, July 30, '45, pp. 82-87.

Points way toward greater efficiency in postwar manufacturing; network of conveyor systems; annealing offsets cold working; primer holes taper reamed; steel cleanliness essential.

25-87. **A Guide to Harmonious Collaboration Between Technical Service and Research.** Norman A. Shepard. *Chemical Industries,* v. 57, July '45, pp. 73-74.

Technical service and research are both necessary functions of a chemical company. Friction between them is not only unwarranted and unreasonable, but can be reduced if not avoided altogether, by observance of the precepts listed.

25-88. **Trade Names Index.** *Industrial Diamond Review,* v. 5, July '45, pp. 154-159.

Index of names used in the diamond tool and allied industries.

25-89. **Aeronautical Supremacy Demands Jet and Rocket Research.** I. Roy Healy. *Aviation,* v. 44, July '45, pp. 152-154.

Forecasting startling future developments, this rocket expert declares that for peace or for war unceasing work in this new field is vital if America is to maintain her place in the skies.

25-90. **Collecting Oil Mists Electrostatically.** A. H. Allen. *Steel,* v. 117, Aug. 6, '45, pp. 120-122.

Electrostatic dust precipitator with main ionizer-collector cell through which exhaust stream passes, and power pack at right to charge the collector. Shows how dust particles are given positive charge and then attracted to negatively charged collector plates.

25-91. **Eight Ways to Efficiency in Materials Handling.** *Production Engineering & Management,* v. 16, Aug. '45, pp. 101-102, 104.

Eight-way pallet, developed by the Naval Ordnance Materials Handling Laboratory, affords numerous and unusual handling advantages in palletized work.

25-92. **Production Machine and Tool Engineering.** *Production Engineering & Management,* v. 16, Aug. '45, pp. 110, 112.

Continuous surface process hardens shafts and tubing; cemented carbide dies cut shell nosing cost 80%; ingenious welding salvages cast aluminum parts; four-spindle drill press provides machine tool.

25-93. **Master Disks.** *American Machinist,* v. 89, Aug. 2, '45, p. 135.

Standard given, effective for production from Sept. 15, 1945.

25-94. **New Production Methods.** Arthur A. Schwartz. *Tool Engineer,* v. 15, Aug. '45, pp. 38-40.

Induction heating, new alloys, harder cutting tools, friction sawing, hot forming, powder metallurgy all portend great advances in postwar years.

25-95. **Scheduling Spare Parts.** A. H. Allen. *Steel,* v. 117, Aug. 20, '45, pp. 140, 142.

Special procurement system to coordinate handling of extra parts with regular production.

26. STATISTICS

26-118. **Tin Restrictions Will Not Be Eased During Reconversion Owing to Mounting Scarcity.** *Metals,* v. 16, July '45, pp. 7-8, 23.

Available supplies dropped 70% since January 1942; more strict control in prospect; substitutes are available.

26-119. **Magnesium Poses Postwar Problems for United States Government and Industry. Part II.** *Metals,* v. 16, July '45, pp. 9-13.

Policy governing disposal of government-owned plants will be to stimulate competition among producers.

26-120. **British Ministry of Supply Relaxes Control over Copper; End-Use Need Not Be Specified.** L. H. Tarring. *Metals,* v. 16, July '45, pp. 15-16.

Government releases figures showing consumption of major non-ferrous metals for entire period of war.

26-121. **The Past and Future of Steel.** *Chemical Age,* v. 53, July 7, '45, Metallurgical Section, pp. 11-16.

Ancient history; eastern technique; bessemer and open hearth; chemical analysis; microscopic methods; Bell's experiments; the Thomas process; rust; protection methods; scrap surplus foreseen; drain on natural resources; large postwar needs; research in the future; trained technicians wanted.

26-122. **The Future of the Light Metal Industry in Britain.** D. D. Howat. *Mine & Quarry Engineering,* v. 10, July '45, pp. 159-165.

Progress and history in production and suggested problems to be pursued. 18 ref.

26-123. **The Future of the Light Metal Foundry Industry.** *Metallurgia,* v. 32, June '45, pp. 49-52.

Light alloy foundry achievements during the war; postwar use of plant and equipment; prices and future markets; alloys and alloy development; research and development.

26-124. **War-Time Consumption of Non-Ferrous Metals.** *Metallurgia,* v. 32, June '45, pp. 73-74, 79.

Ministry of Supply has released detailed figures of the consumption during the war years of the metals within the scope of the Non-Ferrous Metals Control; they deal with copper, zinc, lead, tin, nickel, cadmium, antimony, cobalt and manganese. A full breakdown into the main trades in which each metal was used is given for 1942 through the first quarter of 1945. 1945.

26-125. **More About Metals and Minerals in Postwar Economy.** John D. Sullivan. *Mining Congress Journal,* v. 31, July '45, pp. 34-38.

World outlook in metals and minerals, the effect of scrap on some important metals, and pertinent comments on aluminum, magnesium and petroleum.

26-126. **The Magnesium Industry in the United Kingdom.** H. W. Butterworth, T. W. Atkins and L. H. Davidson. *Modern Metals,* v. 1, Aug. '45, pp. 8-12.

Summary of the findings of a three-man mission from this country on the current developments in the production, fabrication and application of magnesium in the United Kingdom.

27. NEW BOOKS

27-112. **Practical Design for Arc Welding. Vol. 3.** Robert E. Kinkhead. 200 pp., 8½ x 11, Hobart Bros. Co., Troy, Ohio. $3.50.

Sixty more design plates similar to those in the first two volumes, illustrating in graphic form valuable hints on what not to do in designing for arc welding, the origin of modern design principles, and typical patents granted in connection with the welding process.

27-113. **Procedure Handbook of Arc Welding Design and Practice.** Eighth Edition. 1312 pp., illus., Lincoln Electric Co., 12818 Coit Rd., Cleveland, Ohio, $1.50.

Entirely revised to include latest data on new arc welding methods and equipment; 16 new subjects added.

27-114. **High Pressure Die Casting, A Design Guide for Engineers.** H. L. Harvill and Paul R. Jordan. H. L. Harvill Mfg. Co., Los Angeles, Calif. $5.00.

Design aspects of die casting emphasized; comprehensive and usable chart of tolerances; one chapter devoted to pressure mold or premium quality die castings with particular reference to recent specifications; 25 typical die castings discussed. Glossary and index.

27-115. **Advances in Nuclear Chemistry and Theoretical Organic Chemistry.** R. E. Burk and O. Grummitt, Editors. 165 pp. bibl. illus. (Frontiers in Chemistry, v. 3) Interscience Publishing Co., New York, N. Y. $3.50.

27-116. **Electronics Laboratory Manual.** Ralph R. Wright. 77 p. bibl., diagrs., McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $1.00.

A first course laboratory text for students of engineering, especially in the field of electricity.

27-117. **Piping Handbook; Fourth Edition.** Sabin Crocker. 1391 pp., bibl., diagrs., McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $7.00.

New chapters on gas, refrigeration and hydraulic power transmission piping, and corrosion and further material on water-supply piping and flow.

27-118. **Plastics.** John Harry DuBois. Third Edition, 460 pp., illus., diagrs., American Technical Society, Chicago, Ill. $4.00.

27-119. **Heating, Ventilating, Air Conditioning Guide, 1944, 23rd Edition.** 1216 pp., American Society of Heating and Ventilating Engineers, 51 Madison Ave., New York 10, N. Y. $5.00.

27-120. **Roller Bearings.** R. K. Allan. 401 pp., Sir Isaac Pitman & Sons, Ltd. Machinery Publishing Co., Ltd., 17 Marine Parade, Brighton, England. Price 30s net.

27-121. **The Simple Calculation of Electrical Transients; an Elementary Treatment of Transient Problems in Linear Electrical Circuits, by Heaviside's Operational Method.** G. W. Carter. 128 pp., bibl., diagrs., Macmillan Publishing Co., New York, N. Y. $1.75.

An explanation of the engineering side of electrical circuits and the algebra and calculus of their formulas.

27-122. **Cutting Tool Practice.** H. C. Town and D. Potter Paul Elek, Ltd., Africa House, Kingsway, London, W. C. 2 England, 13s. 6d. net.

27-123. **Testing Machine Tools.** Fourth Edition. George Schlesinger, 94 pp. Machinery Publishing Co., Ltd., 17 Marine Parade, Brighton, England. Price 17s. 6d net.

27-124. **Cast Iron in the Chemical and Process Industries.** F. L. LaQue. 27 pp., Gray Iron Founders' Society, 33 Public Square, Cleveland, Ohio. $1.00.

Information on the properties and applications of gray cast iron.

27-125. **Kurzes Lehrbuch der Technologie der Brennstoffe.** Wolf Johannes Muller. 568 pp., illus., J. W. Edwards Co., Ann Arbor, Mich. $11.50.

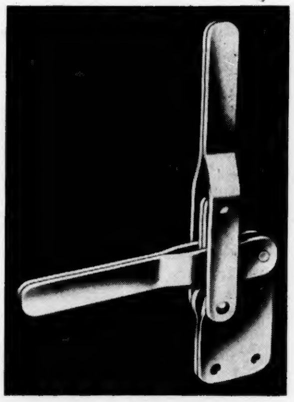
27-126. **Wektor und Dyadenrechnung fur Physiker und Techniker.** Erwin Lohr. 426 pp., illus. (Arbeitsmethoden der modernen Naturwissenschaften), J. W. Edwards Co., Ann Arbor, Mich. $7.00.

NEW PRODUCTS IN REVIEW

TOGGLE-ACTION CLAMP

Knu-Vise, Inc., Detroit 6, Mich.

A new toggle-action clamp having a base straight in line with the handle for flush mounting has been announced by this company. Having a straight base instead of a flanged one, this clamp, known as KV-216, thus increases the range of mounting possibilities. It can be fastened upright, on its side, or at any odd angle to meet particular requirements. The toggle bar can be cut to meet requirements. With the pressure pad located at the normal position $\frac{5}{8}$ in. from end of toggle bar, a pressure of 240 lb. can be obtained with a hand pressure on the handle of only 70 lb.



Like all other Knu-Vise clamps, this model requires but one motion to lock it on the work and a like reverse motion to release it. When finished with one job, it can be transferred to another fixture for further duty.

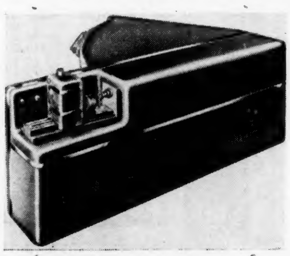
This model KV-216 is $8\frac{13}{16}$ in. high, $6\frac{3}{8}$ in. long, and weighs 24 oz. All parts, except toggle bar, are heat treated. Entire clamp is cadmium plated.

Mention R-225 When Writing or Using Reader Service.

NEW TWO-METER SPECTROGRAPH

Harry Dietert Co.,
9330 Roselawn Ave., Detroit 4, Mich.

A new two-meter grating spectrograph designed for the analysis of highly alloyed ferrous metals and other materials containing complex spectra, as well as for general research work, has just been announced by A. R. L. Dietert of Glendale, Calif. and Detroit, Mich.



Capable of identifying 72 elements, the new spectrograph may be used for indentification, sorting and miscellaneous or research applications, as well as routine or research quantitative analysis.

A high-dispersion yet compact instrument was achieved through the use of super-fine gratings with a large number of ruled lines per inch. Two kinds of original gratings are available. One grating has 36,600 lines per in. or 91,500 total lines. This grating produces a dispersion of 3.40 A per mm. in the first order and 1.70 A in the second order. The spectrum available for photography in the first order is 2100 to 7000 A and 1850 to 3500 in the second order.

The second grating has 24,400 lines per in., totaling 61,000 lines. This gives a dispersion of 5.2 A per mm. in the first order and 2.6 A per mm. in the second order. The spectrum that may be covered in the first order is 1850 to 9200 A and 1850 to 4500 in the second order.

The new two-meter spectrograph can be supplied with either of the two gratings described. Both gratings may also be furnished, in which case one or the other may be brought into use by a small angular shift of the incident beam from one grating to the other.

A 24-in. movable camera provides a 20-in. spectrogram on a 35-mm. spectrum film. It can be positioned along the Rowland circle so that any 20-in. portion of the total 60-in. spectrum may be photographed at one time. Two cameras may also be supplied for simultaneous photography of 40 in. of the spectrum. Eighteen spectra can be photographed on a single strip of film.

Mention R-226 When Writing or Using Reader Service.

ACP ELECTRODES

Westinghouse Electric Corp.
P. O. Box 868, Pittsburgh 30, Pa.

Speedy and economical welding in all positions and with a.c. and d.c. reverse polarity is an advantage of the new ACP electrode available in seven diameters from 5/16 to 3/32 in.

The new heavily coated electrode, recommended for high quality welds on work which is not easily positioned, forms a light, porous slag which is easily removed from each pass by light brushing. Because of high tensile strength and ductility of welds made with ACP, this rod is especially suited for use in such demanding applications as heavy plate fabrication, shipyard, pressure piping, pressure vessels and general structural steel work.

Mention R-227 When Writing or Using Reader Service.

NEW SILICA BLOCK

Brown Instrument Co., Philadelphia, Pa.

A new silica block for measurement of crown temperatures in glass tanks has been developed for use with Radiamatics (Brown Instrument's radiation pyrometers). The new silica block is said to have more constant calibration than is usually experienced with thermocouples, more open scale divisions throughout the operating range, and lower net cost. The increased service life of the Radiamatic and its new accessories will more than offset additional initial costs.

The single hole silica block is installed flush with inside roof surfaces. It is sometimes installed so that the bottom of the block extends into the furnace for several inches. The Radiamatic is sighted into an 18-in. Sillimanite target tube which is installed in the block to within $\frac{1}{4}$ in. of the bottom. An air-cooled fitting only is necessary to prevent overheating of the Radiamatic under normal operating conditions. The target tube is maintained under a slight positive pressure by connecting to a low pressure air supply.

The Sillimanite target tube is accurately positioned by adjustment of the vertical support. The annular opening between the Sillimanite tube and the silica block is packed with rock wool or similar material to prevent accumulation of batch dust.

Mention R-228 When Writing or Using Reader Service.

THERMICAST

Metal and Thermit Corp.
120 Broadway, New York, N. Y.

A special type of thermit, known as "Thermicast", for producing steel castings, has been developed to solve the problem of obtaining sound, clean steel castings quickly and simply, irrespective of size and intricacy of shape, when regular steel melting facilities are unavailable. Thermicast is especially designed for the production of steel castings and is not to be associated with welding for which it is not suitable.

The new casting material utilizes the thermit reaction, requiring neither fuel nor electric power, the reaction being carried out in a specially designed conical-shaped crucible of sheet steel lined with refractory.

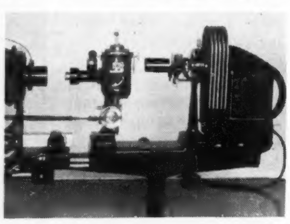
Mention R-229 When Writing or Using Reader Service.

NEW PRODUCTS IN REVIEW

METALLOGRAPHIC ILLUMINATOR

Bausch & Lomb Optical Co., Rochester, N. Y.

A zinc sulphide film, coating the clear glass vertical illuminator plate of the new Bausch & Lomb ILS and MILS metallographic equipment, doubles the efficiency of the illuminating units in these instruments. The new B & L coating provides twice as much light in the image, cutting photographic exposure time in half. This improvement is especially valuable for high magnifications and for specimens of low reflecting power which require long exposures.



Only about 2½ millionths of an inch thick, one-fourth the thickness of a wave length of light, the coating works on the principle of the interference of light waves. If the film is made with a refractive index lower than that of the glass, more light goes through the glass and less is reflected. On the other hand, if the index of refraction of the film is greater than that of the glass, the results are reversed—less light goes through the glass, and reflectance is increased.

In the Bausch & Lomb metallographic equipment mentioned above, rays from the light source are reflected by the vertical illuminator plate onto the specimen, and back through the transparent illuminator plate to the eyepiece and camera. Hence, any increase in the amount of light reflected by the transparent plate onto the specimen results in an increase of light at the eyepiece and photo negative.

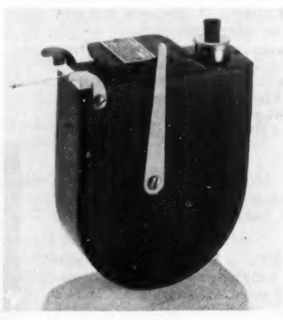
Bausch & Lomb adopted the new coating at the suggestion of Dr. A. H. Pfund of Johns Hopkins University.

Mention R-230 When Writing or Using Reader Service.

RECORDING GALVANOMETER

The Brush Development Co.,
3405 Perkins Ave., Cleveland 14, Ohio.

Direct ink-on-paper chart recordings of wider frequency range and greater sensitivity than heretofore attainable are possible with this instrument. It embodies a low mass, 3-in. long tapered tube recording pen, actuated by a permanent magnet pen motor utilizing newly developed material and techniques. The pyrex-tipped pen faithfully records directly in ink on a moving paper chart, pressures, vibrations, strains, currents and voltages of frequencies from d.c. to 120 c.p.s. It has no overshoot up to 70 c.p.s. at a maximum swing amplitude of 20 mm. each side of center line. The pen can be conveniently centered on, or raised from the chart.



Impedance of the pen motor is 1500 ohms. Minimum sensitivity is 1.1 mm. per volt, 1.6 mm. per ma., 21 volts full scale.

Overall dimensions—only 5 in. high by 4 in. wide by 1⅝ in. thick—facilitate minimum spacing of multiple units on 1¾-in. centers. Four No. 10-24 tapped holes are located in the rear face for convenient mounting. A large ink well minimizes frequency of refilling. The Brush recording galvanometer weighs 4 lb. and is available as shown or with three-speed paper drive (2-in. wide chart) and one or two channels, or single-speed paper drive (12-in. wide chart) and four to six channels.

Mention R-231 When Writing or Using Reader Service.

THREE-PURPOSE WELDING ELECTRODE

Air Reduction Sales Co.,
60 E. 42nd St., New York 17, N. Y.

A new combination type welding electrode, Airco No. 315, designed to produce horizontal fillet welds with flat or slightly concave profiles and concave fillets in the flat position, as well as satisfactory deep fillet and deep groove, has been announced by Air Reduction.

Usual applications for the new electrode include pressure vessels and their connections, heavy machine weldments, structural assemblies such as trusses, built-up girders and connections and practically all heavy steel assemblies where high weld quality is important.

Airco No. 315 electrode is recognizable by its steady, forceful spray type arc. The thick, porous slag which completely covers the weld deposit under practically every condition is readily removed. The electrode may be used with conventional technique, employing normal currents, under which conditions medium penetration is obtained. Deeper penetration is secured, however, when the deep fillet technique is used with the high currents recommended for this procedure. The new Airco No. 315 can be used for any job that calls for a 6020 or 6030 electrode and may be applied with either the alternating or direct current, straight or reverse polarity.

Mention R-232 When Writing or Using Reader Service.

HIGH SPEED STEEL WELDING ROD

American Manganese Steel Division,
American Brake Shoe Co., Chicago Heights, Ill.

This new steel welding rod was developed to save time and reduce costs in making, salvaging and altering cutting tools, and for hard surfacing operations requiring extreme hardness and resistance to shock and corrosion.

Toolface is a super-hard and tough alloy tool steel welding rod composed of high carbon, high chromium, high molybdenum, tungsten and vanadium (commonly known as high speed steel). Its welded deposits have a Brinell hardness of 575 to 675, depending on the dilution of the metal.

Known as Toolface, it is especially adapted for the production of composite cutting tools, including those used on lathes, shapers, milling heads, etc. Its ready weldability expedites the deposition of cutting edges or lands on mild steel bases or shanks. This method, plus its high degree of hardness and the ease with which Toolface cutting surfaces can be dressed, results in substantial economies in tool making. A bulletin pictures the four simple steps in making a composite high speed cutting tool with Toolface, using carbon steel as a base. Temperatures for various heat treatments for Toolface work are tabulated.

The accompanying illustration shows Toolface deposited on inexpensive carbon steel and forged to shape. It is noticeable that the line of fusion has not been affected by the forging operation. The specimens were etched in dilute hot sulphuric acid, so the resistance of Toolface to corrosion is apparent.

Mention R-233 When Writing or Using Reader Service.

VACUUM-TUBE ANTICIPATOR CONTROLS FURNACE TEMPERATURES

Westinghouse Electric and Mfg. Co.,
306 Fourth Ave., Pittsburgh 30, Pa.

The development of a vacuum-tube thermocouple device characterized by its anticipating nature increases the sensitivity and response of conventional temperature controls by 1000%, according to M. J. Manjoine, research engineer of this company. This instrument consists of two thermocouples of different thermal capacity and an electric heating element, enclosed in an evacuated glass envelope to cause heating of the thermocouples by radiation, to minimize room temperature effects, and to prevent deterioration of the elements. Changes in electric furnace temperatures are anticipated and corrective steps taken to minimize the cyclic swings in temperature characteristic of most furnace controls.

As an example of the efficiency of the device, a heat treating furnace varied over a range of 50° F. (± 25°) prior to supplementing the control with this anticipator. After connecting and adjusting the anticipator the variation was 5° F. (± 2.5°).

The anticipator, because of the different characteristics of the thermocouples used, reacts to temperature changes quicker than the furnace and initiates the control operation sooner and minimizes temperature fluctuation. The two thermocouples in the instrument and the control thermocouple in the furnace are connected in series so that the polarity of the couple with less thermal capacity is additive and the couple with greater thermal capacity is subtractive with respect to the furnace couple.

The heating element of the instrument is energized by the power source connecting the control mechanism and the relays that operate the main power contactors. Thus the furnace and instrument heating elements operate together. The two couples in the instrument are equidistant from the heater but the element with the lesser thermal capacity reacts first to changes in heater element temperature.

When the two couples in the anticipator are at the same temperature, the voltage from the control thermocouple to the control mechanism is constant. At the time that the control thermocouple institutes a change in control current, for example, starts the heating part of the cycle after having been off, the change is felt first in the two thermocouples in the anticipator. However, the thermocouple with the lower thermal capacity heats faster than the other and the thermocouple voltage at the temperature control mechanism is increased. This increased voltage causes the controller to change to cooling, thus preventing the furnace temperature from overshooting the desired maximum. When the opposite action takes place and the furnace is in the cooling portion of the cycle, the anticipator thermocouple with larger thermal capacity cools more slowly and its reversed polarity causes the control mechanism to change to heating and keep the furnace temperature from overshooting the minimum limit. A variable resistance in the heater circuit of the anticipator provides a means of controlling the frequency of operation of this supervisory furnace-temperature control.

Should the line voltage dip (or rise) the instrument heater reflects this change much more quickly than the furnace heating elements and the control is properly energized to correct for the power variation before the need is recognized by the thermocouple in the furnace.

Mention R-234 When Writing or Using Reader Service.

IMPROVED LABORATORY MODEL TABLET COMPRESSING MACHINE

F. J. Stokes Machine Co., Philadelphia 20, Pa.

The "Eureka" tablet compressing machine has been improved in design and strengthened in construction to make it more widely adaptable for research and other laboratory work and for manufacturing industrial specialties where limited production is required.

Improvements include a more efficient feeding device for handling materials difficult to feed; the frame has been greatly strengthened; the ejection cam is now milled to give smoother action; and an improved adjustment of the lower plunger enables the press to make very small tablets. This redesign makes this little laboratory press highly efficient under continuous power operation.

Applying pressure of 1½ tons, with a maximum die-fill of 7/16 in. and producing tablets up to ½ in. diameter at rates up to 100 per min., this press has hundreds of applications in experimental work, for making test pellets, proving industrial specialties such as chemical products, catalysts, etc., pharmaceuticals, ceramic mixtures such as Steatite, carbon and powder metallurgy tests, and many other purposes. It is an efficient machine for the actual manufacture of such products in limited quantities.

It produces tablets fully equal in physical properties to those made on larger machines. A core-rod attachment can be provided to make cored pieces. Bench space is 12x18 in. only; height 24 in.; motor ¼ hp. It is available without motor for hand operation, also with variable speed drive to handle efficiently various size tablets in runs of considerable length.

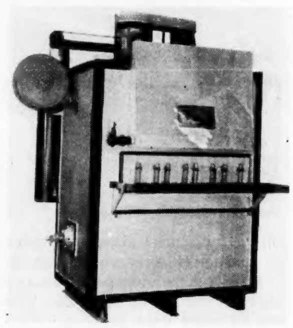
Complete 48-page catalog, with specifications on this and other models of automatic compressing machines, is available.

Mention R-235 When Writing or Using Reader Service.

FIRST CONVECTION FURNACE FOR BRASS AND ALUMINUM FORGING HEATS

Morrison Engineering Corp.,
5005 Euclid Ave., Cleveland, Ohio.

A new recirculating convection type furnace suitable for both brass and aluminum forgings has been installed recently by the Harvey Metals Co. of Chicago. This installation, built by Morrison Engineering Corp., is believed to be the first combination brass and aluminum forging furnace in operation today. It has a temperature range of 800 to 1600° F. with precision heat control.



The furnace is a recirculating 100% convection type and is used with gas or oil burners or a gas-oil combination. Electric heat may also be used. It has a capacity of 500 to 750 lb. of aluminum or 1000 to 1500 lb. of brass slugs per hr. Larger sizes are available.

Slugs are fed into the furnace at one side and removed from the opposite side. Long rods may be laid on a rack extending from the hearth. The furnace is lined with heat resisting alloy rather than refractory to prevent fine brick particles from being circulated by the high pressure recirculating fan.

Rapid, uniform heating is provided by large circulation and heavy insulation. This furnace occupies a floor space 3 ft., 10 in. wide by 5 ft., 6 in. long. It is portable and can be re-installed wherever necessity indicates.

Mention R-236 When Writing or Using Reader Service.

PROJECTION WELDER

Sciaky Bros., 4915 W. 67th St., Chicago 38, Ill.

The advantage of forging pressure is provided in this new 150-kva. projection welder. The pressure sequence consists of an initial low pressure during the flow of welding current. This is sufficient to establish good contact without burning off the upper side of the projections. The pressure is also low enough to prevent a crushing of the projections which would reduce the heating efficiency of the welding current.

A forging pressure of higher value follows immediately after the passage of welding current. This quick follow-up of high electrode pressure reduces brittleness, sheet separation, and assures uniform welds with a minimum supply of power.

The addition of electrode holders easily converts the machine to a spot welder. A retraction stroke is provided which will permit a short ½-in. working stroke. The machine is a self-contained unit, with electronic controls mounted in a hinged cabinet, convenient to the operator.

The welder, type PMC01-9, has a capacity of six projections on 0.080-in. mild steel. Throat depth is 18 in. with maximum working space between arms of 21 in. Maximum pressure is 2600 lb. for 90-psi. line.

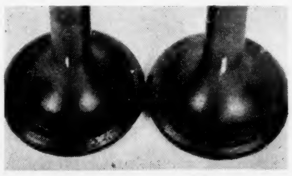
Mention R-237 When Writing or Using Reader Service.

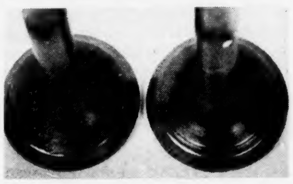
NEW PRODUCTS IN REVIEW

NEW VALVE FACING ALLOY

Eaton Mfg. Co., Wilcox Rich Div., Detroit, Mich.

"Eatonite", a new long-wear valve facing alloy, has been developed after more than two years of research by the Wilcox-Rich Division. The new material has operated 200,000 miles in laboratory tests without refacing and company engineers say it is the hardest valve facing material known to the industry that will retain its hardness in the "red zone" (above 1000° F.), and at the same time resist corrosion.





Present trend in engine design is to achieve improved performance by increasing both the compression ratio and the charge, or fuel-air mixture, according to V. G. Young, chief engineer of Wilcox-Rich. This means increased operating temperatures and resulting higher demands on valves. The new alloy contains chromium, nickel, tungsten and cobalt and promises satisfactory performance at high operating temperatures with improved resistance to deformation and wear under severe operating conditions.

Resistance of Eatonite to corrosion was demonstrated by tests using an automotive type heavy duty L-head engine, with valves faced with Eatonite and also with a tool alloy. Valve positions were reversed during the tests to equalize operating conditions. Eatonite (in the lower view) showed little corrosion, while the tool alloy (above) shows pitting and considerable loss of metal. Eatonite has approximately the same hardness as tool alloy at room temperature, but retains its hardness appreciably better at 1000° F. and above, and is superior to "80-20" valve steel in this respect.

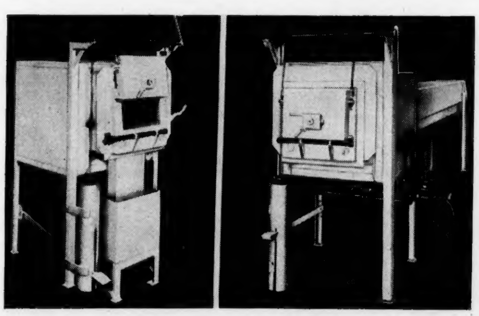
Mention R-238 When Writing or Using Reader Service.

KLEENMETAL ATMOSPHERE FURNACES

W. S. Rockwell Co., 50 Church St., New York 7, N. Y.

To meet the demand of tool rooms, experimental and moderate batch heating requirements for furnaces that provide correct heating with assurance of bright or clean surface finish, this company has developed a broad range of "Kleenmetal" oven-type protective atmosphere furnaces. They are designed for temperatures between 1200 and 2400° F. on such heating operations as bright annealing, silver or copper brazing, tool hardening, high speed steel hardening, scale-free hardening, non-decarburizing heating or sintering powdered metals.

These batch furnaces, substantially lined, insulated and reinforced, are of two types: (1) Those with carborundum or alloy muffles, and (2) those which are heated directly. Muffle furnaces may be gas or oil-fired; direct heated furnaces may be gas or electric. Both types are supplied with the means for introducing prepared atmosphere gas



from separate generators or cylinders, or for producing, for certain operations, the desired atmosphere from controlled combustion of gas in the combustion chamber of the furnace.

For hardening and certain other heating operations, the long preheating chamber has a chute leading to a quench tank set in front of the furnace. For bright or clean annealing, brazing, sintering, etc., both muffle and direct heated furnaces are equipped with a water-jacketed cooling chamber for cooling the work in the protective atmosphere.

A heavy, self-sealing door inclined against the front plate of the furnace makes a tight contact to minimize heat and gas leakage. This door has a smaller swing-type door with a sight hole for observation of work and for loading or removing small pieces from the furnace without exposing a large area of the furnace to the atmosphere. Under the charging door (and the discharge door of the cooling section) there is a gas burner to provide a flame curtain which prevents air infiltration.

Photograph shows at left electric furnace with chute and quench tank. This furnace may be gas or oil-fired, direct heated or equipped with muffles. At right is gas-fired muffle furnace with water-cooled cooling chamber.

Mention R-239 When Writing or Using Reader Service.

ELECTRODE FOR HEAT AND CORROSION RESISTANCE

Arcos Corp., 1515 Locust St., Philadelphia 2, Pa.

Chromend 9-M, an alloy electrode depositing weld metal of 8 to 10% chromium and 1.5% molybdenum, has been developed to meet the need for an electrode that will give greater strength and greater corrosion resistance combined with high creep resistance. Chromend 9-M bridges the gap between Chromend 5-M, a to 6% Cr-Mo electrode and Chromend 12, a 12% Cr-Mo electrode. Detailed information and samples will be supplied upon request.

Mention R-240 When Writing or Using Reader Service.

BLAST NOZZLE

American Foundry Equipment Co.,
555 S. Byrkit St., Mishawaka, Ind.

Adding to its present line of Long-Lyfe blast nozzles, this company is now in a position to supply a complete line of nozzles using the well-known Norbide boron carbide inserts. An added feature contributing to long service life is the jacketing of this insert in an abrasion resistant alloy steel. The new nozzle is guaranteed for 1500 hr. of service when used with steel shot or grit and for 750 hr. when used with silica sand.

Improved blasting efficiency, decreased air consumption, and low hourly costs are among the advantages claimed by the manufacturer.

Mention R-241 When Writing or Using Reader Service.

CUSHIONED MOVEMENT FOR DIAL INDICATORS

Federal Products Corp., Providence, R. I.

A new shock absorbing mechanism termed "cushioned movement" has been built into this company's dial indicators. In perfecting this new cushioned movement, exhaustive practical tests were made on all available types of shock absorbing mechanisms, and the result is a distinct improvement in precision gaging.

The function of the cushioned movement is to absorb the impact of sharp blows or rough handling, so that their force is cushioned before it reaches the small gear teeth, jewels, pivots or other intricate parts of the indicator mechanism itself, and causes basic injury to the instrument. The Federal indicator movement has not been altered, nor is the size and appearance of the indicator changed in any way.

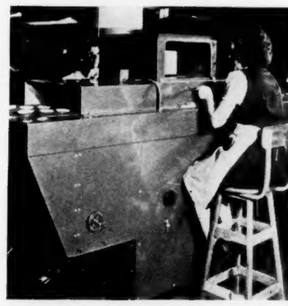
Ample use in the field under diverse trying conditions has fully demonstrated the economic value and practicability of this new shock absorber. In one instance a user checks the depth of over 40,000 fuse parts per day without trouble or repairs on the indicator. Another cushioned movement indicator was in constant use for 16 hr. a day, six days a week, under what was referred to as "very abusive" treatment; careful examination following this use showed that all mechanical parts of the indicator were in perfect condition with its repetitive accuracy unimpaired.

All regular improved movement Federal indicators in C, D and E sizes (English dials) and P, Q and R sizes (metric dials) can now be furnished with cushioned movement with the exception of models E3BS and Q6IS. Regular Federal dial indicators now in use (with the exception of the B sizes) may be returned to the company for installing the new cushioned movement at a nominal cost.

Mention R-242 When Writing or Using Reader Service.

CONVEYOR TYPE X-RAY FLUOROSCOPE

North American Philips Co., Inc.
100 East 42nd St., New York, N. Y.



This Norelco Searchray Model 150 CF is a new conveyor design used widely in war plants for X-ray inspection of machine parts. Operators can be positioned on one or both sides of the unit. Objects are view through the indirect fluoroscipc head and defective pieces can be marked without having to stop the conveyor.

Mention R-243 When Writing or Using Reader Service.

ALNICO HORSESHOE MAGNET LOCATES CASTING FLAWS

Dings Magnetic Separator Co.,
509 E. Smith St., Milwaukee 7, Wis.

Alnico horseshoe magnets are now being employed with finely divided magnetic sprinklings to inspect castings and welds for flaws. The horseshoe magnet is placed on the underside of the surface being inspected, and the magnetic sprinklings are spread on the upper surface. Operating on the known principle that magnetism always seeks an edge, the sprinklings are induced by the magnet to collect at any minute internal or external cracks, if they exist, and to show up clearly as a line of powder.

This method of inspection is used where certain critical areas are known to develop cracks often, or for exploring surfaces of all castings. Both castings and welds can be inspected where the thickness of metals is as much as 1 in. The Alnico horseshoe magnet is 2½ in. wide and 3 in. high. Pole bases are ¾x¾ in.

Mention R-244 When Writing or Using Reader Service.

READER SERVICE COUPON

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The Metals Review, September 1945

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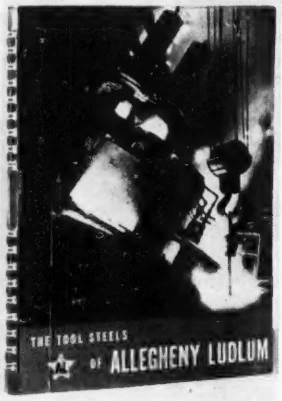
MANUFACTURERS' CATALOGS IN REVIEW

Tool Steels

Allegheny Ludlum Steel Corp.,
Brackenridge, Pa.



A 170-page, pocket-size catalog and manual, entitled, "The Tool Steels of Allegheny Ludlum", provides a complete and straight-forward coverage of tool steels for all uses and users. It contains many pages of technical data and is liberally illustrated. Thumb-indexing and sectional arrangement plus a full general alphabetical index, make it easy to use.

Mention R-245 When Writing or Using Reader Service.

Metal Fluoborates

General Chemical Co.,
40 Rector St., New York 6, N. Y.

The varied uses of a number of metal fluoborates in electroplating and metallurgical operations are discussed in this convenient file-folder 16-page brochure. Fluoborates discussed as the new chemical tools of industry include cadmium, chromium, copper, ferrous, indium, lead, nickel, silver, stannous and zinc. Ammonium and other alkali fluoborates are discussed for working molten magnesium and aluminum metals, as fluxes for welding and soldering such metals as silver, gold, stainless steel, nickel, etc. Their further use for heat treating, hardening and other processes can be expected with new developments in the light metal field.

Mention R-246 When Writing or Using Reader Service.

Callinite Alloys

Callite Tungsten Corp.,
540 Thirty-ninth St., Union City, N. J.

New four-page folder describes a group of alloys under the name "Callinite" which are made by the powder metal process. It is a high conductivity facing material for high current applications where pitting, sticking or welding of contacts may occur. It is also suitable for facing arcing tips on air circuit breakers, heavy duty circuit breakers, motor controllers, heavy duty relays, industrial control contacts. Callinite alloys are available in rods, squares and rectangles, and inserts.

Mention R-247 When Writing or Using Reader Service.

Isothermal Heat Treatment

Ajax Electric Co., Inc.,
Frankford Ave. at Delaware Ave., Philadelphia 23, Pa.

While there has been much editorial discussion of the heat treating process termed variously isothermal quenching, cycle annealing or interrupted quenching, this is the first attempt to fulfill the real need for an equipment bulletin on this important process. Readers interested in design, production or processing of metal components will want this eight-page booklet discussing the process and equipment required. Both the batch-type and conveyorized furnace units are described and illustrated.

Mention R-248 When Writing or Using Reader Service.

Stainless Welding Electrodes

Alloy Rods Co., York, Pa.

A 24-page catalog illustrates and describes several types of stainless arc welding electrodes, together with an electrode analysis and color chart, recommended current ranges for welding and American Iron and Steel Institute type numbers applicable to these products. Because of the wide diversity in applications of stainless welding, three distinct types of electrode coatings are available—Lime, Titania and AC-DC.

Mention R-249 When Writing or Using Reader Service.

Metal Sawing

W. O. Barnes, Co., Inc.,
1297 Terminal Ave., Detroit 14, Mich.

This 48-page "Handbook of Metal Sawing" contains several pages filled with general recommendations on the use of hand and power hack saws, together with instructions on the operation and adjustment of metal cutting band saws. The handbook tells the complete story of Barnes hack saw blades and band saws, with sizes, full specifications and prices on each.

Many tables of recommended teeth and speeds relating to hand and power hack saws and conventional and skip tooth band saws, specification tables with saws required for the various makes of band saws, and other tables provide useful, informative data to improve the performance of equipment. Special attention is paid to narrow width and skip tooth band saws for high speed cutting of soft non-ferrous alloys.

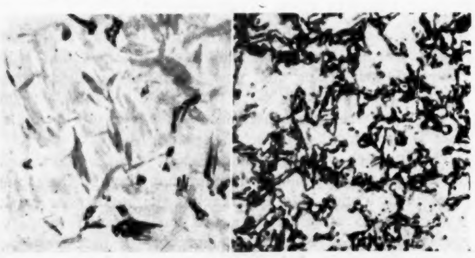
Mention R-250 When Writing or Using Reader Service.

Purnell Method of Heat Treating

By Charles G. Purnell and H. M. Pfahl
Tate-Jones & Co., Inc., Plaza Bldg., Pittsburgh 19, Pa.

The desirable characteristics imparted to steel by heat treatment may be classified under five main headings: (1) Good physical properties, principally hardness and toughness, (2) minimum distortion and warpage, (3) freedom from cracking, (4) good machinability, and (5) uniformity. The fifth property, which could be considered to include all of those mentioned, is of the utmost importance. Products must be uniform throughout any one piece and uniform from one piece to the next. The heat treating process to be described here, known as the Purnell process, provides improved quality and uniformity which in turn means fewer rejections and fewer re-treatments. Only those qualities affected by the quenching operation are discussed.

Four basic features make up the Purnell process. First is uniformity of the quench which determines uniformity of microstructure and is obtained by the use of carefully positioned and powered propeller agitators. Second is increased speed in quenching which assures better microstructure by reduction or elimination of pro-eutectoid ferrite and high temperature transformation product. The third feature is accurate timing of the quench; the time is precisely regulated and, once set for a specific article, is adhered to closely. It may be long enough to form a certain amount of martensite or only long enough to form bainite. The fourth point is immediate tempering, without allowing the quenched work to cool any more than is absolutely necessary. This helps produce greater toughness and less warpage, and eliminates any possibility of developing minute incipient internal ruptures which may encourage subsequent failure of the part.



The higher quenching rate and more complete removal of scale result in higher as-quenched hardnesses with many steels which have a fast critical cooling rate. The micrographs at 1000 magnifications above are of SAE 2340 steel for airplane engine rocker arms. Structure at the left was produced by the Purnell method; as-quenched hardness is Brinell 512. The structure at right was produced by a conventional quench and temper; as-quenched hardness is Brinell 387.

For the same tempering temperature, higher tensile and yield strengths are obtained as well as materially increased toughness, as indicated by the photograph below of wrenches, lock washer and rail anchor.

Microstructure of a steel plays an important part in determining its machinability. The Purnell process produces material with better than normal machinability because of higher quenching rate and also because this increased cooling rate is gained on all sides of the piece of steel being quenched. Fewer soft spots and less warpage will also aid in prolonging tool life and giving smoother machining. The uniform quench provided by the Purnell process produces a heat treated part having a homogeneous structure with good machinability.

Warping and cracking are caused by stresses set up by thermal expansion and contraction and by the size change that accompanies the phase transformations in the steel. They are promoted by poor heating, poor design, and poor quenching and tempering. The Purnell process, by providing greater uniformity of cooling on all sides of the quenched article, eliminates wide temperature differentials and uneven phase transformation. Second, the accurate timing of the quenching period prevents the work from being quenched "dead" cold and thus discourages the setting up of severe internal stresses. Third, by immediate tempering, stresses get little chance to manifest themselves, and those which have been set up are almost immediately relieved.

The Purnell method has been successfully applied to parts ranging in size from small gun trigger mechanisms to large gun tubes, armor plate, shells, and miscellaneous parts of all shapes, sizes, and grades of steel. It is definitely a production method of heat treating.

Experimental data and photographs used above are courtesy of Carnegie-Illinois Steel Corp. A catalog describing the Tate-Jones line of modern heat treating furnaces and industrial gas and oil burning equipment is available on request.

Mention R-251 When Writing or Using Reader Service.

Machining Stainless Steels

Rustless Iron and Steel Corp.,
3400 East Chase St., Baltimore 13, Md.

This new 84-page reference book points up the fact that thousands of new wartime users have overcome their timidity about using stainless steels and have learned that a change in technique, not a change in equipment, is the key to successful machining of these alloys.

Titled "Machining of Stainless Steels", this volume is another in the Rustless "Library of Stainless Steel Information". The book has been designed as an aid in reducing machining costs. It presents data from the shop man's angle by devoting sections to all the standard grades of stainless steel and their cutting rates for various operations, machine tool equipment and their proper feeds, tool angles, designs and compositions, cutting fluids as well as useful sets of tables for the machinist and estimating engineer concerning finishes and tolerances of bar stock, coarse-thread elements, drill sizes, hardness conversions, etc. Thumb-indexed and wire-bound, this book may be obtained through the Reader Service Coupon on page 17.

Mention R-252 When Writing or Using Reader Service.

Magnesium Alloy Forgings

Revere Copper and Brass, Inc.
Rome Mfg. Co. Div., Rome, N. Y.

An essential component in the design of many mechanisms and structures, Revere's magnesium alloy "twice wrought" forgings are fully described in this 20-page booklet. Magnesium affords the design engineer almost unlimited opportunities for exercising his ingenuity in postwar design. Revere offers a complete line of wrought magnesium alloy products in many forms and for companies making their own forgings, magnesium forging rod in standard shapes and in special extruded shapes is available.

Attractively illustrated, this book deals with the advantages of magnesium alloy forgings, their machining, tolerances, corrosion resistance and fatigue strength. Many tables are included to show comparative machinability ratings, properties of cutting fluids, relative power required to machine metals, mechanical properties, physical constants and relative weights of metals.

Mention R-253 When Writing or Using Reader Service.

Brass and Bronze Forgings

Titan Metal Mfg. Co., Bellefonte, Pa.

This eight-page broadside is a pictorial presentation of hot pressed brass and bronze forgings. The company has had a wide experience in a variety of forging designs and manufactured nearly 28 million forgings in 1944 alone.

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